THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXV. No. 1936.] LONDON, JUNE 19, 1900. [52ND YEAR. PRICE 6d.

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
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THE ORIGINAL
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A PAINT MIXED READY FOR USE,
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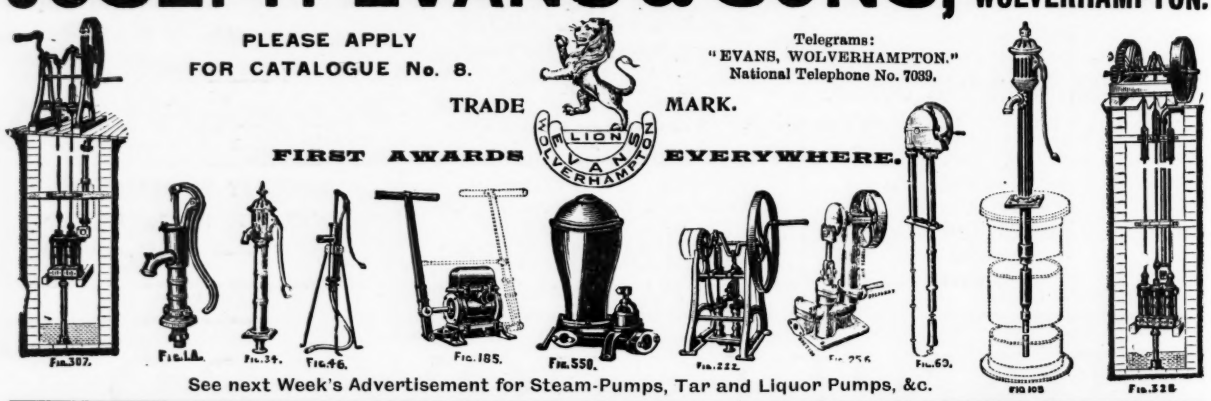

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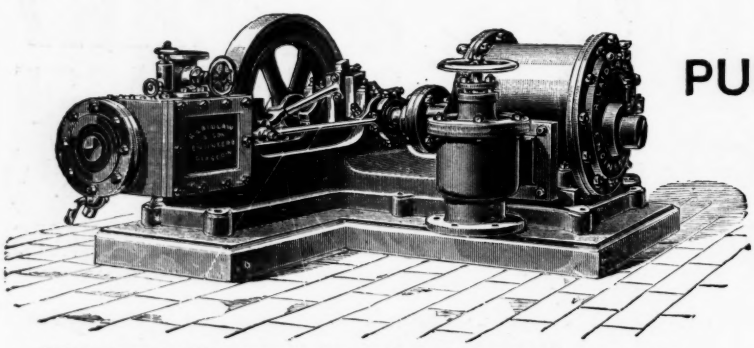

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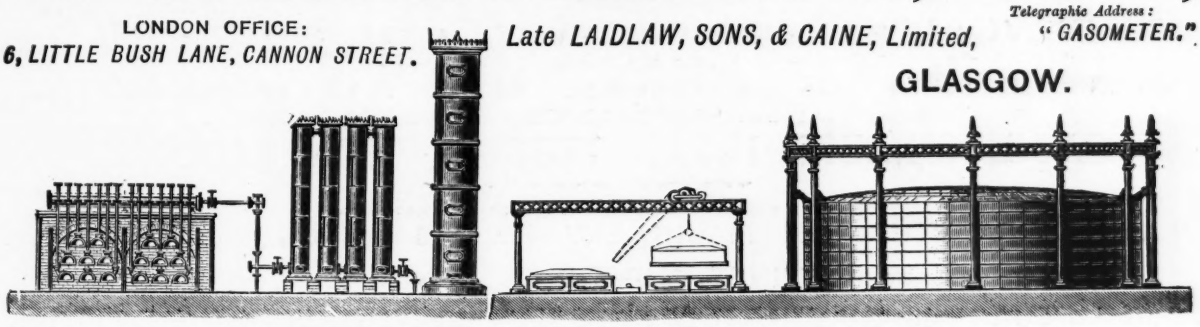

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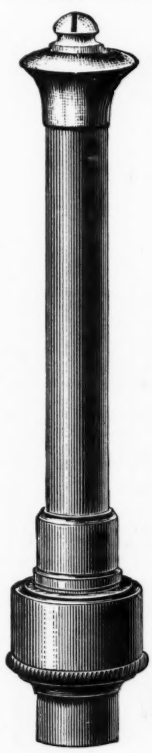

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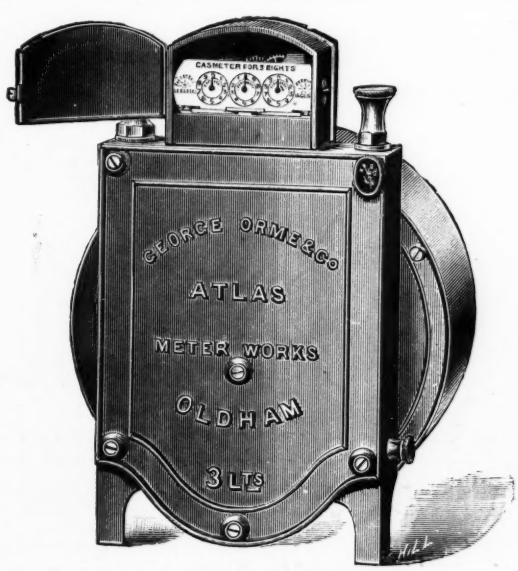

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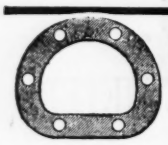

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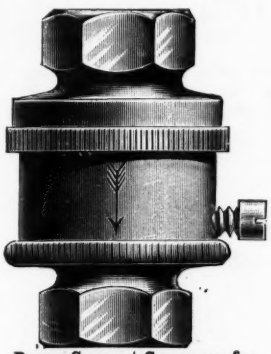
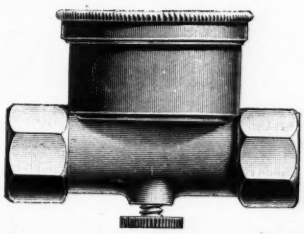
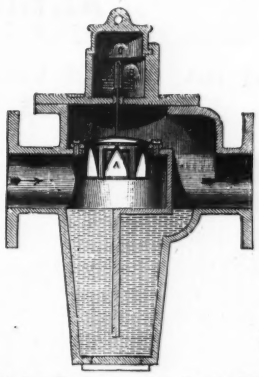


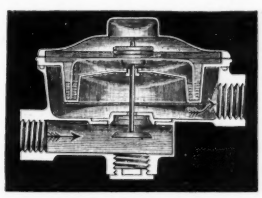
Down-Current Governor for Regenerative Lamps, &c.



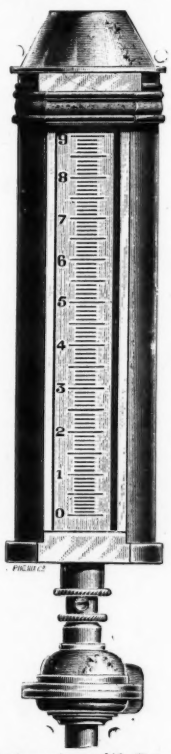
Governor for Gas Stoves and Fires.



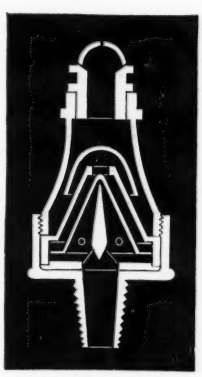
District Governor for Controlling Gas Pressures in Hilly Districts.

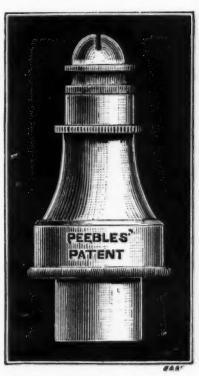


Mercurial Governor, to Regulate Pressure at Gas-Meter for a number of Burners, such as in Churches, Halls, Works, &c.

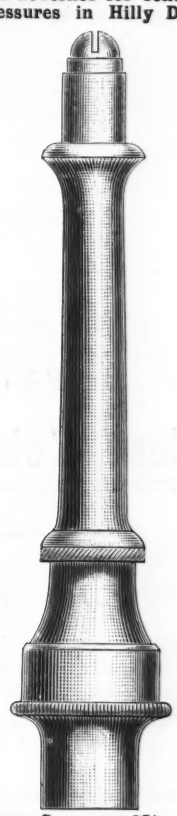


Jet Photometer with Pressure & Volumetric Governors, 17/6.

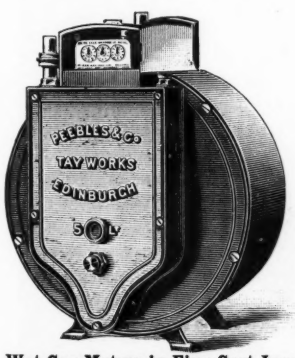




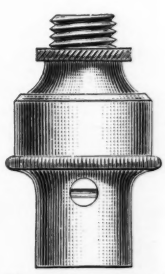
The World Famed Needle Governor Burner, Taper Screw, and $\frac{3}{8}$ in. or $\frac{7}{16}$ in. Screwed Socket. Price 12/- per dozen.



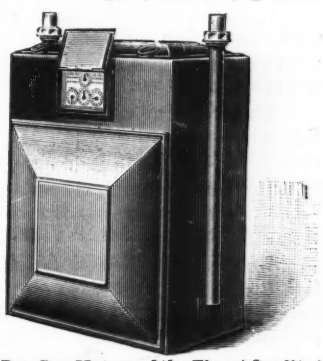
Street Lamp Governor, 24/- per doz.



Wet Gas-Meters in Fine Cast-Iron Cases.



Up-Current Governor for Argand Burners, &c.



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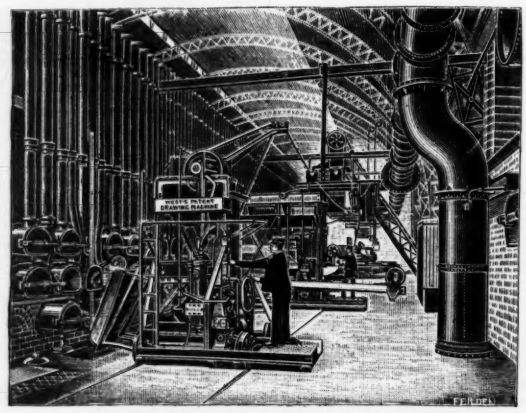
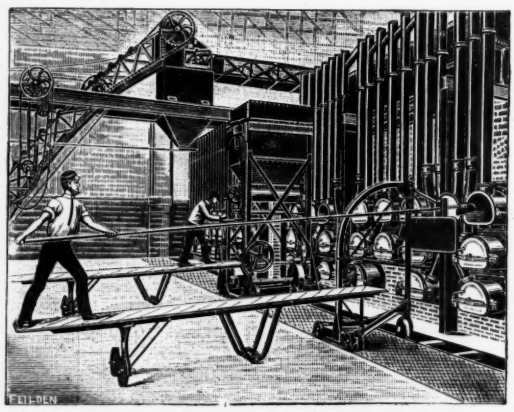


West's Compressed Air Charging and Drawing Machinery for Gas-Retorts.



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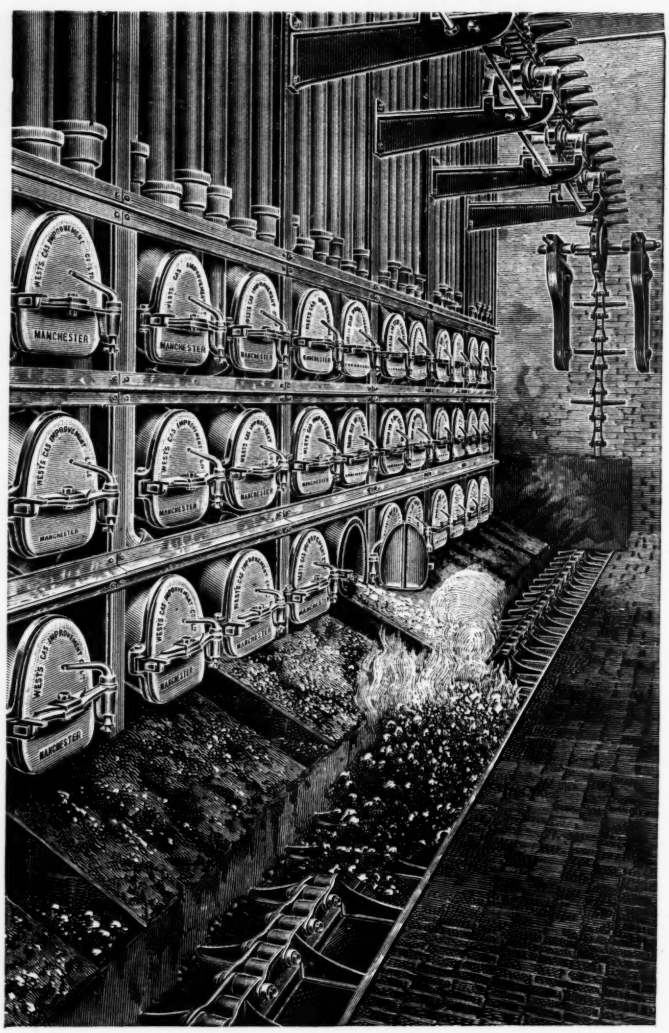
Silent Coke-Conveyor.



SPECIAL FEATURES:

This Conveyor is specially adapted for Elevating and Storing Coke in the Coke Yard or Overhead Hoppers.

SILENT IN ACTION, and is easily driven; the power required for driving being very small.

Has easily renewable and inexpensive wearing parts.

Is fitted with HUNT'S PATENT ROLLER CHAIN, which is specially adapted for the conveying of gritty materials, as the Rollers prevent excessive wear of the Chain Wheels.

The working parts of the Chain and Slide-Bar are easily and efficiently lubricated by a special lubricator fixed at one point.

No Rivets or Bolts in the Chain to work loose; the whole of the Chain being kept together by the Joint Pins.

DOES NOT MAKE ANY BREEZE, as the Coke does not roll over in its passage along the Conveyor; and no violent rubbing of the pieces against one another occurs.

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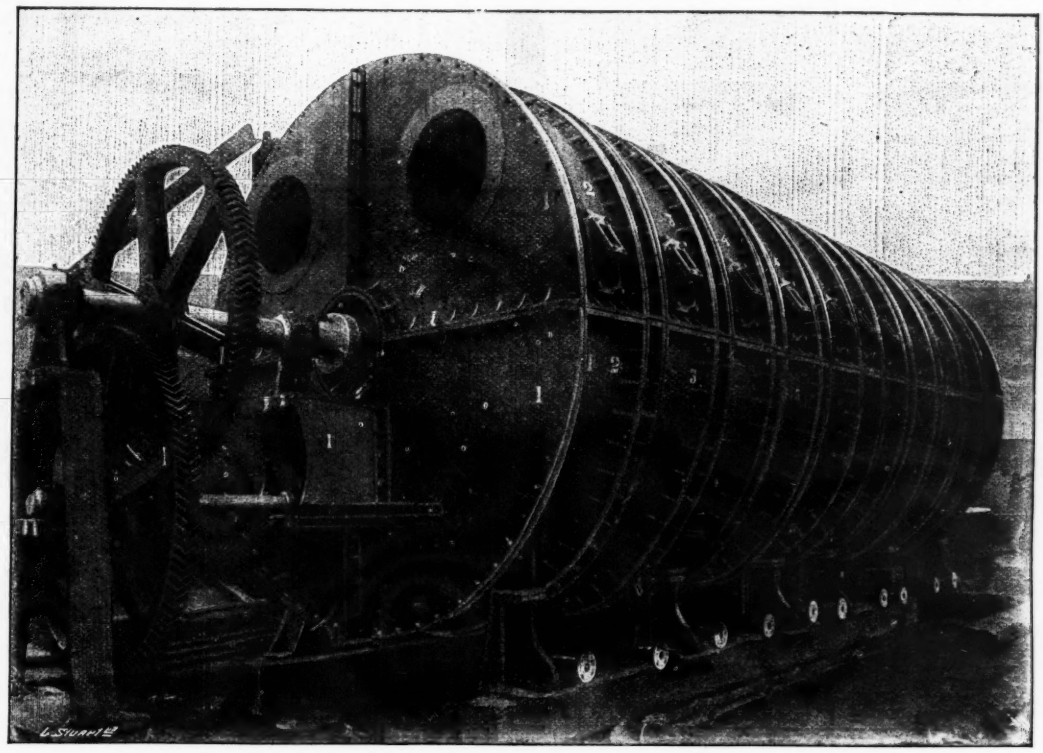
PATENT "NEW" SCRUBBER-WASHER

RESULTS GUARANTEED.



RESULTS GUARANTEED.

Similar Machine recently erected at

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NOTE: Orders already received in **1900** for MACHINES to deal with **35,300,000** Cubic Feet of Gas per Diem.

Bringing up the Output of Machines in under Four Years to over

106 MACHINES.

Having a capacity for treating 158,800,000 Cubic Feet of Gas per Diem.

ADVANTAGES.

TOTAL removal of TAR.

Practically the ENTIRE REMOVAL OF AMMONIA.

Distinct REDUCTION OF SULPHURETTED and CARBONIC GASES.

Production of the HIGHEST STRENGTH of AMMONIACAL LIQUOR without any DETRIMENTAL EFFECTS upon the ILLUMINATING PROPERTIES of the GAS.

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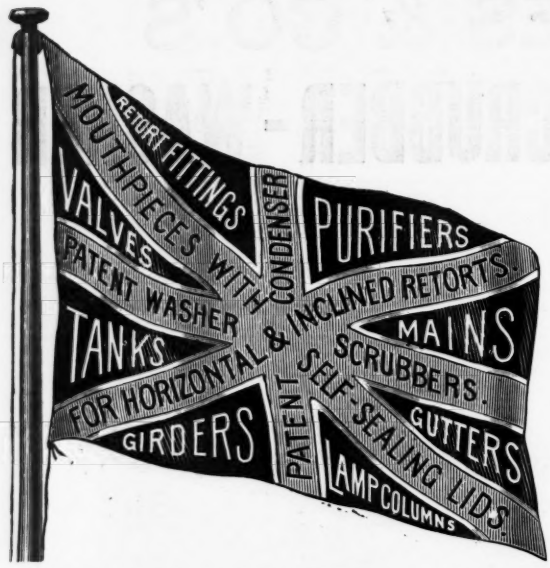
London Office: 80, CANNON ST., E.C. *Telegrams:* "IGNITOR."



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GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

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Carburetted Water-Gas Plant.

SPECIAL DESCRIPTIVE CATALOGUE ON APPLICATION.

PATENT WATER-TUBE CONDENSER

Over 120 now in use.

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For keeping Cups of Gasholders free from Ice.

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THE "DE BROUWER"

PATENT COKE CONVEYOR

FOR ELEVATING AND CONVEYING.

Supersedes all others for dealing Automatically with

HOT COKE.

DOES NOT BREAK THE COKE. SIMPLE AND EFFECTIVE.

30 INSTALLATIONS now at work.

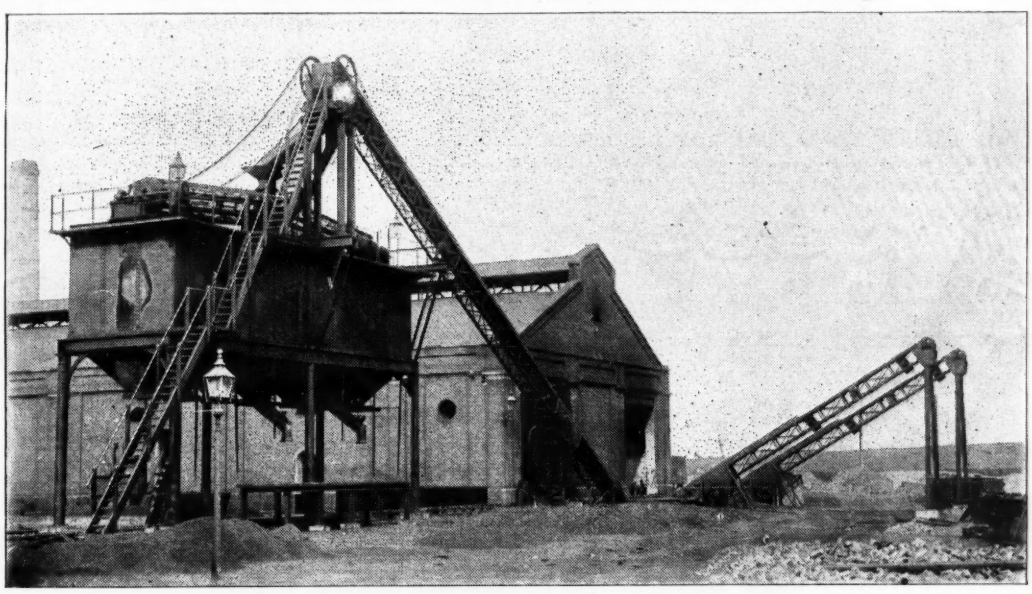
SPECIAL FEATURES OF PATENT.

Conveying, Quenching, Draining, and Elevating by one Apparatus in one Operation.

No Elevator Boot or Pit; no waste of water into Elevator Pit.

No Smashing of Coke in passing from Conveyor to Elevator.

The Quenching is done where the Conveyor changes from Horizontal to Inclined, and the water drains back down the Slope.



THE DE BROUWER CONVEYOR is at WORK IN ENGLAND at the CRYSTAL PALACE DISTRICT GAS-WORKS WITH GREAT SUCCESS.

The whole Conveyor is of

BRITISH MATERIAL AND MANUFACTURE

And is Guaranteed by Sole Makers:

W. J. JENKINS & CO., LD., RETFORD.

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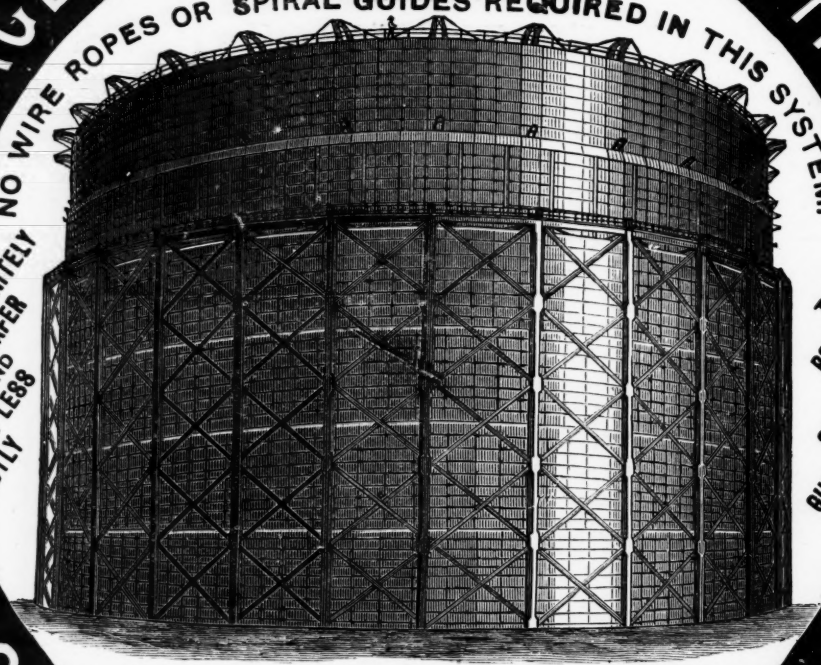
THE LARGEST GASHOLDER IN THE WORLD

CAPACITY 12 MILLION CUBIC FT.

GASHOLDERS OUR SPECIALITY

NO WIRE ROPES OR SPIRAL GUIDES REQUIRED IN THIS SYSTEM.

INFINITELY SAFER AND FAR LESS COSTLY THAN ROPES OR SPIRAL GUIDES.



ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company

IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

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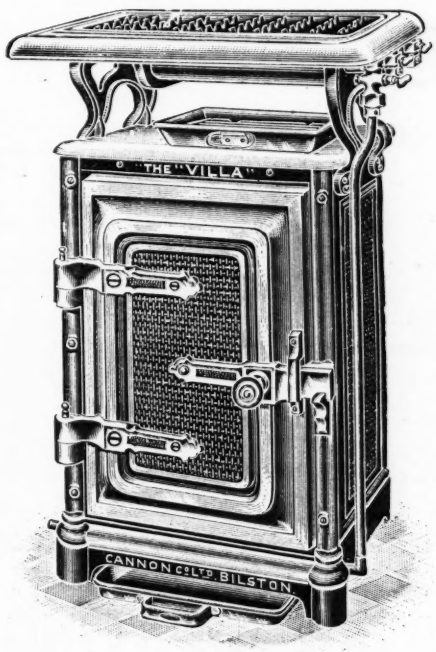

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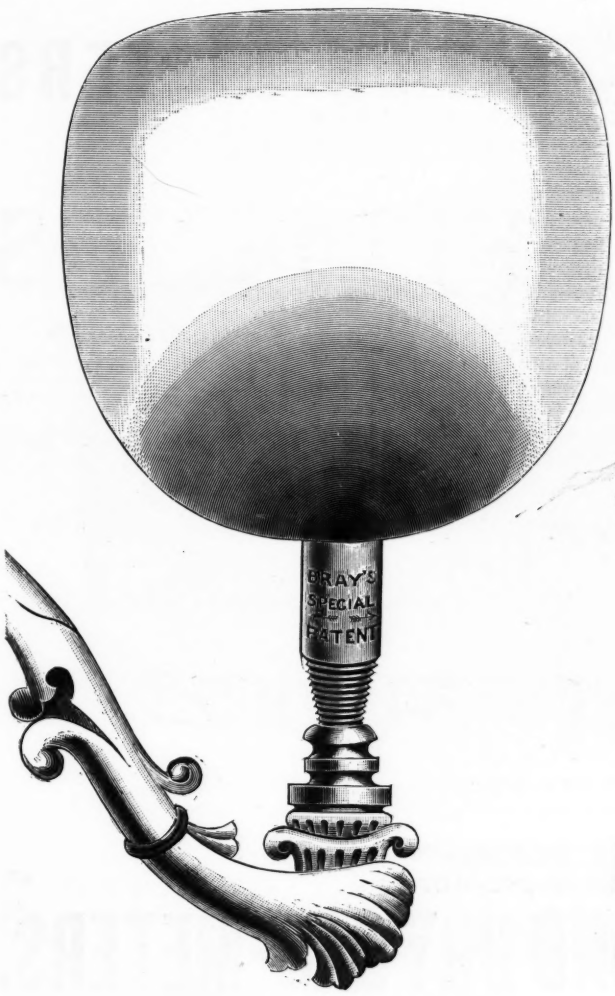

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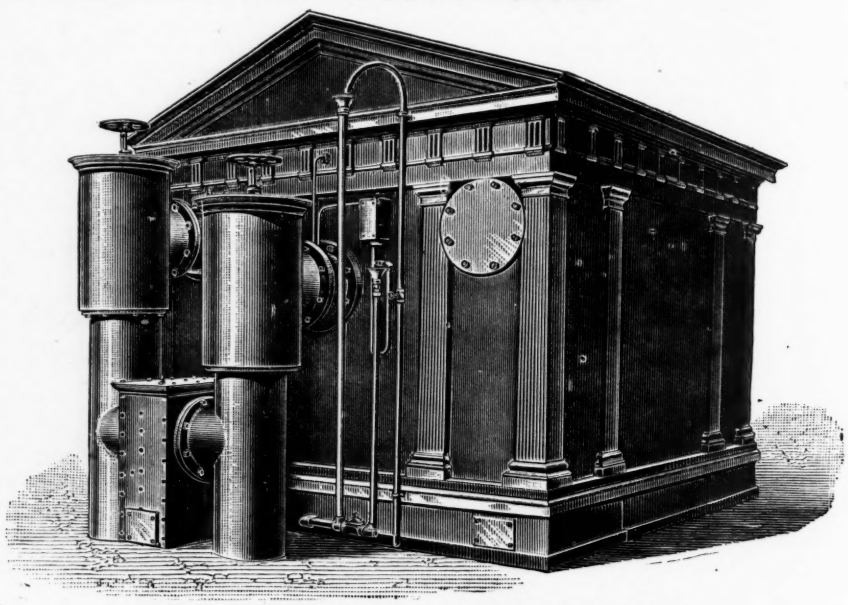

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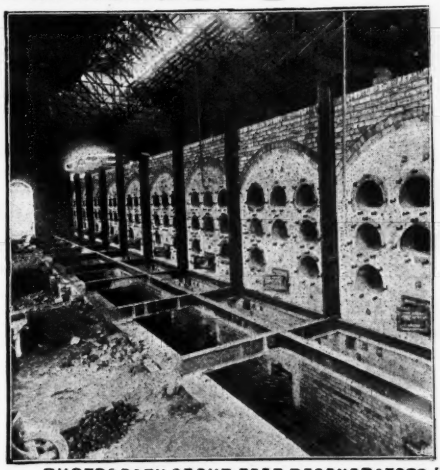

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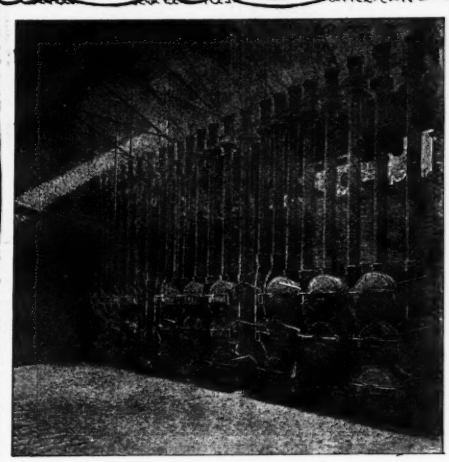

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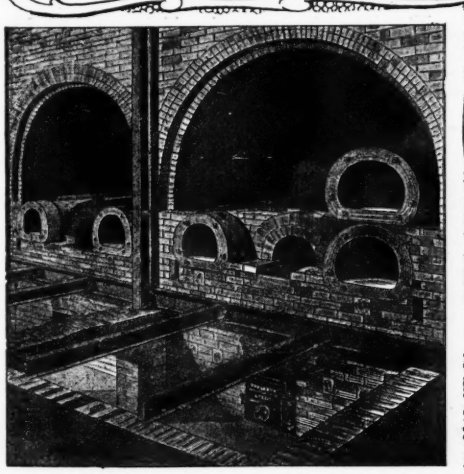

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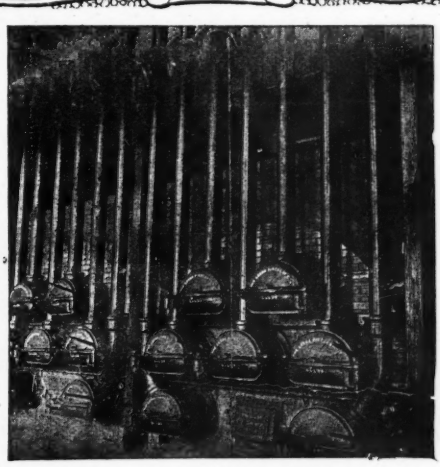

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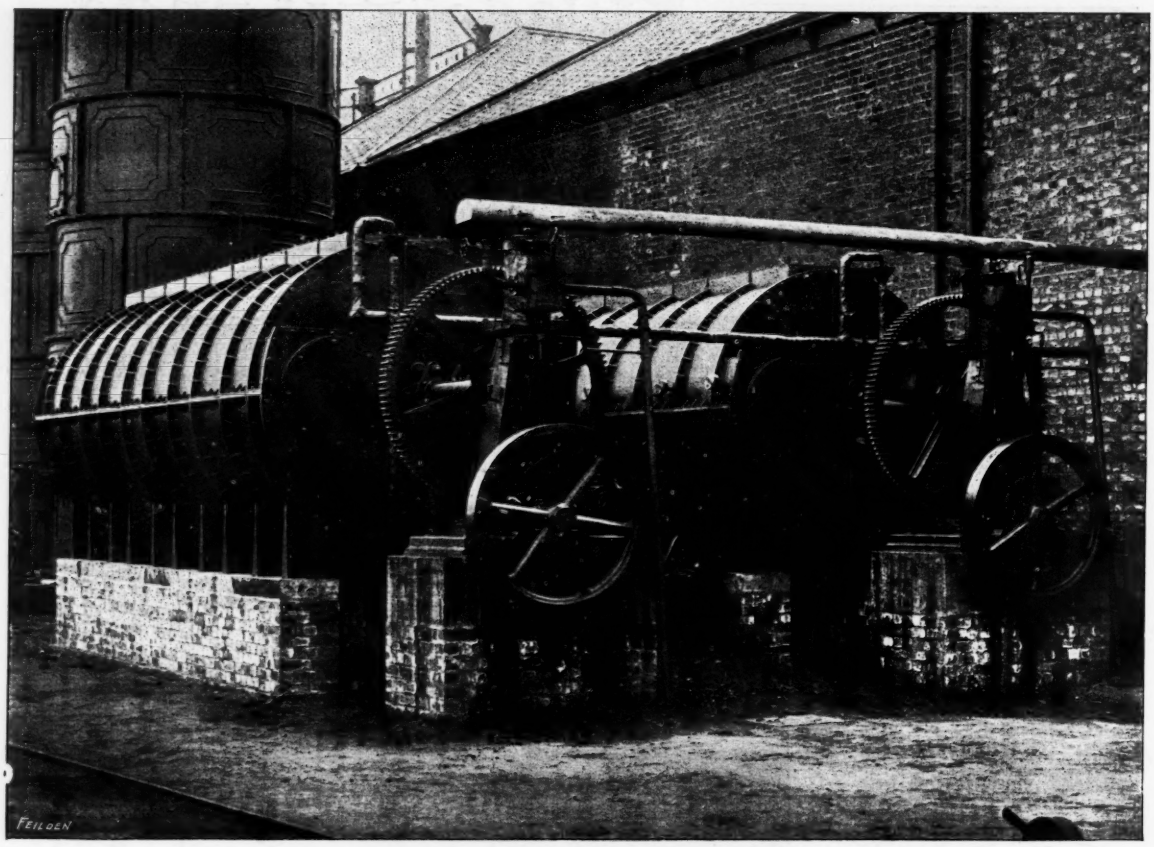

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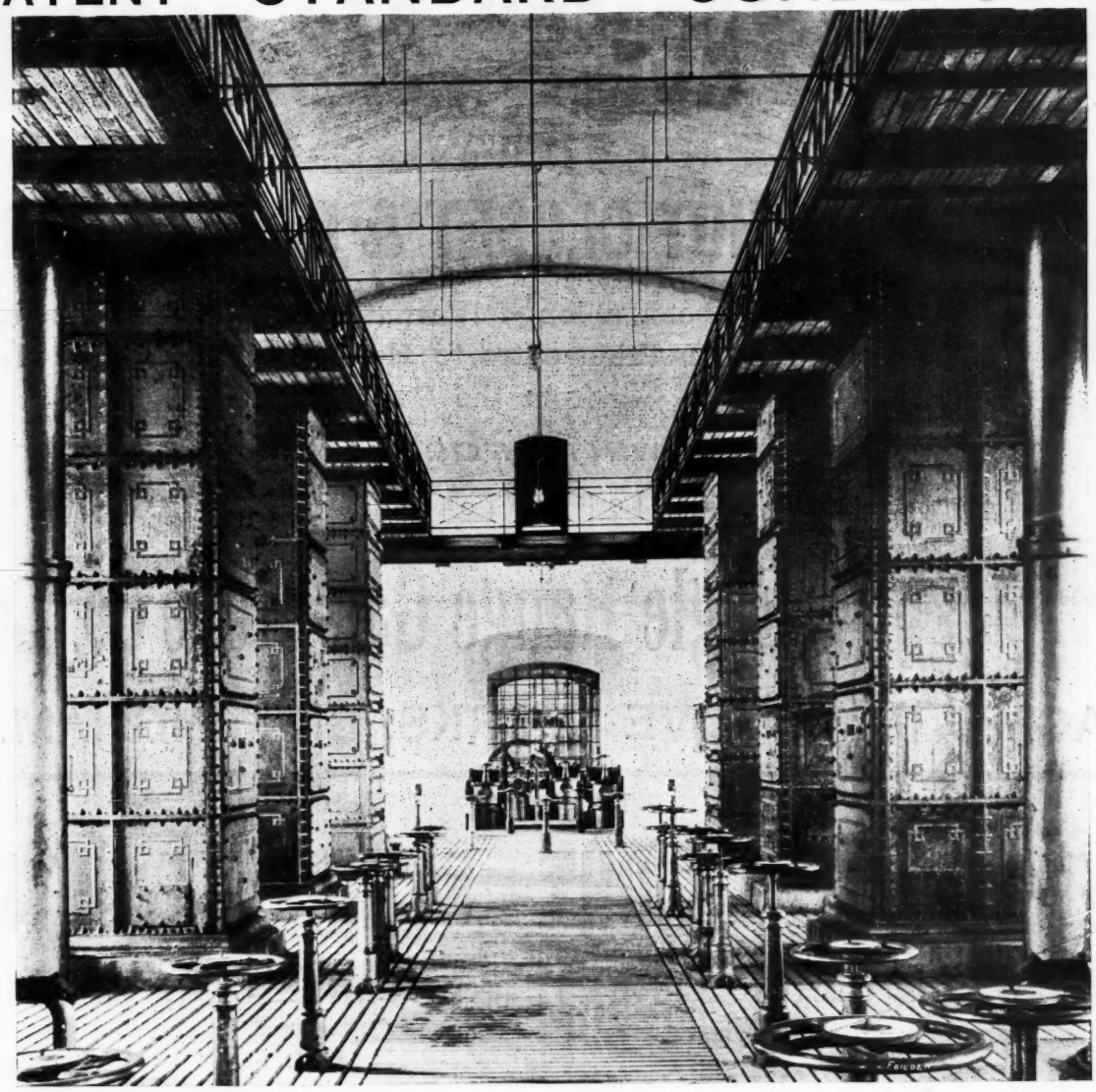

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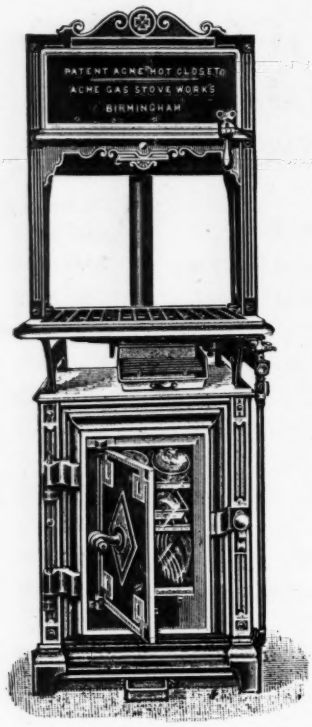

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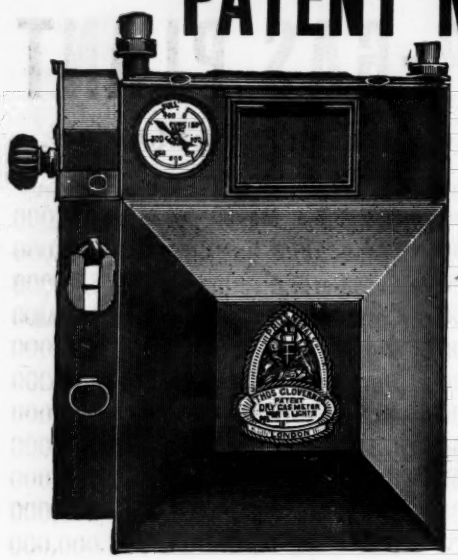

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EDITORIAL NOTES.

The Position of the Gas Institute.

THE meeting of the Incorporated Gas Institute last week presents to an impartial observer of the whole proceedings the appearance of a mingled yarn, good and bad together. The technical fare provided by the endeavours of the Honorary Secretary and the Council, in the shape of papers and communications, was, with but one or two exceptions, scanty in quantity and of small actual interest. There were, of course, several powerful reasons for this, which no pains of the governing body, nor any amount of goodwill on the part of the members generally, could contend against. Some of these blighting influences were particular and temporary—such as the necessity for sacrificing a good deal of what would have entered into an ordinary programme for the sake of the Paris trip—but others, and probably the more serious, were constitutional, and referable to a state of things in the profession which must be described later. Apart from the technical portion of the transactions, members had enough to think about in the question of the formal union of the membership of the two national professional organizations; and the fashion in which they handled this all-important matter on the two days of the meeting was decidedly "mixed" in grain. Before discussing the subject on the merits, which will be the chief purpose of this article, it is due to the President (Mr. E. H. Stevenson) to record the devotion which he has admittedly shown during his year of office to the difficult and delicate task of realizing, in the shape of a scheme of amalgamation, the feeling in favour of union in the profession so clearly manifested in the course of last year's meeting. As a very active professional man, Mr. Stevenson must have made many irksome sacrifices of time and attention to this special affair of the Institute. The Honorary Secretary and the members of the Council, too, must have passed through an anxious and laborious year, in the discharge of responsibilities differing wholly in kind, and vastly surpassing in weight the ordinary routine work of office.

This being said, it is a painful reflection to make that, when the fruit of all this labour was submitted to the members assembled this day week, as much as anything for the express purpose of taking cognizance of and considering it on the merits, it was rejected. The business went off, partly through mismanagement, partly through the intemperate language of some and the injudicious acts of others, and partly through confusion and lack of understanding of the issues submitted to the vote. The pity of it was that up to a point all went well; and while the conduct of the business by the President was excellent, the Chair enjoyed the confidence and support of the preponderating party of union on the lines suggested by the Council. The abstract resolution in favour of union was carried unanimously. One amendment after another was defeated by large majorities; the voting revealing the existence of a clearly defined, and not unexpected, element of opposition to the particular course of action recommended by the Council. Then came the surprise. Upon the executive resolution authorizing the governing body of the Institute to take the necessary steps for liquidating the Company, the vote failed (by four) of the requisite three-fourths majority. An attempt to repair the mischief by means of a poll had an even more unfortunate fate; and the members separated for the day with the uncomfortable feeling that somehow they had blundered into an altogether false position. It is a significant indication of the real state of mind of the members, as a whole, that the announcement of the result of the poll was received in dead silence; the gathering forthwith dissolving as glumly as if everybody had been to a funeral.

It is desirable to place these significant facts on record, because otherwise those who were not present on the occasion might misunderstand the report of what happened; and there have been too many regrettable misunderstandings about the whole affair to render endurable the prospect of an addition to the number in this connection. If there was a voting member taking part in these critical divisions who was gratified with the result, he was most careful to keep his feelings to himself. There may have been a small party of Irreconcilables present; but they found no encouragement to crow over the stultification of the Institute. The great majority were heartily sorry, and many not a little ashamed, as business men, of the condition to which the outbreak of the poor old game of cross-purposes, and petulancy of temper, had reduced all the elaborate edifice which was intended to

shelter a re-united profession. This feeling grew until it found adequate expression on the following day in a resolution, carried without a dissentient voice, that the new President and Council should pick up the dropped threads of the diplomacy and statesmanship that had already brought union within reach, and should resume the endeavour to attain the heartily desired end at the earliest possible moment. No worthy member of the profession will disparage this frank, cordial, and eminently sensible arrangement.

Members of the Institution of Gas Engineers certainly will not wonder at, or put an unkind construction upon, the failure of the party of union within the Institute to carry their agreement through at the first attempt. It is conceded on all hands that the first approaches towards union are more difficult for the Institute than for the Institution to take. While the best opinion of both Societies agrees that the good of the profession and of the industry demands that any possible professional organization of the future shall not include members whose connection with the industry is merely mercantile, it is the fact that the Institute actually contains members of this description, while the Institution does not. While the members of the Institution are bound by their own corporate principles to make the preservation of this distinction between different orders of followers of the industry a fundamental rule of any new technical society they may substitute for the present companionship, and are quite free to act up to their principles, the like-minded members of the Institute find themselves under the painful obligation to impose their will in this regard upon a numerous body of their fellow-members whose corporate rights in the Institute are equal to their own. The old Council accepted the necessity of dealing with the whole body of the members of the Institute whose major interest in gas is purely commercial, without respect to persons; and accordingly the President was directed to "take the bull by the "horns," and ask these members in writing to consent to their own demission from the roll of the Institute. Now that no mischief can be wrought by the criticism, one is free to express a doubt whether the President was altogether so happy in his function of "the complete letter-writer" as was desirable for the attainment of the object in view. His notions of strategy seem to have partaken of the character of those of the British Generals who did not at first invariably command success in South Africa.

The real source of weakness in these preliminary proceedings, however, was precisely the same as that which in a less degree troubled the other President and Council. It was that the whole transaction was *ultra vires*. There had been no regular reference of the matter to the Council, with instructions to act; and consequently, when the Council tabled the provisional agreement into which they had entered with the other side, they were open to attack for having gone too far, promised too much, and acted too exclusively in accordance with the conditions of union laid down on behalf of the Institution, and without consulting with their own people. Here was the chance of the malcontents, and they took it. Here, also, was the opportunity for the manipulation of the velvet-gloved hand; and it was missed. There was little real weight in the opposition; but, such as it was, it sufficed to wreck the Council's scheme, assisted by the tremendous force which the necessity for a three-fourths majority on the executive resolution for winding up lent to the minority.

Now it has all to be gone through again, but with the difference that the thunderstorm has cleared the air. There would have been a fresh, and perhaps a more serious split in the Institute than ever, if an expedient for keeping the matter in action had not been adopted at the last moment. An unknown number of members of the Council and others would certainly have withdrawn from the Institute as soon as the meeting was over; and there would have been thrown upon those responsible for the rebuff of Tuesday the task of keeping the organization going. As it is, however, the threatened breach is only put off; it is by no means averted. The new governing authorities and all the members will have to make up their minds definitely on the plain issue of whether they wish to retain the trading members or to let them go. It is mere shirking the issue to put it behind certain well-known and honoured names, and lash up a fine fervour of indignation at the suggestion that the bearers of these names should be asked to retire in order that a new technical society may be formed on a fresh basis, and without them. It is as unjust as it is impolitic to thus confound the question of principle with the claims, real or imaginary, of individuals; and if it were either polite or legally safe to do so, a black could be found to set off every white. Hard cases must not be allowed to make bad law. It must be a question of yea or nay, all or none. What may be done later, cannot be taken into consideration. Of course, if any ordinary members of the Institute prefer to everything the corporate companionship of their mercantile friends, they have a perfect right to give constitutional effect to their wishes. Only, they must do so with full knowledge of the consequences. They and their friends must be prepared to run the Institute.

The late Council, with their supporters, who showed themselves to be the majority at the last meeting, must be taken for serious-minded persons, and men with the courage of their opinions. They would never have put their hands to the scheme they recommended unless they had been convinced of its necessity and propriety. They will not go back upon their deliberate judgment. They will at the most wait a reasonable time, and see what use is made of the open door which the meeting so carefully set ajar again. It is those men who have had recent experience of the difficulty and have felt the drawbacks of the existing unhappy division of the ranks of the profession, who realize that the plea for unity is no sentimental aspiration. On the other hand, the cry for the retention at all costs of a particular order of members who have never been distinguished for helpfulness in the work of the Institute, and whose room would, in general, be far preferable to their company, is either sentiment or it is something much worse. If these gentlemen, as a class, wish for the advantages of association on their own account and for the good of the industry of gas lighting, they are at liberty to form themselves into a society of their own. The judgment of the majority of gas engineers and managers is that they can get on with their technical education better in the absence of those who have, or hope to have, trade dealings with their employers. The argument for the inclusion of traders with gas managers, on the asserted analogy of the Institution of Civil Engineers, which does not expel a member because of his opening a shop, is radically unsound. As a rule, the members of the Institution of Civil Engineers are men who are their own masters. Nine-tenths of the possible constituency of a gas industry society are not their own masters. This makes all the difference. Besides, there is the ample answer to all merely sentimental pleas for the retention of commercial men in a society chiefly composed of salaried officials and professional men, who form a little world of their own—and no bad world either, if it comes to a question of honest work or hearty play—that it has been tried; and it is not so satisfactory as the alternative, modern, and improved arrangement.

Pronouncements on the Coal Difficulty.

THE coal question naturally continues the topic of prime interest in industrial circles generally, as well as in the gas world in particular; and pronouncements thereon are the order of the day. Some—such as that of Mr. Thomas Burt, M.P., whose monthly circular to the Northumberland Miners' Association has been given considerable prominence in the Press, as if it were a valuable contribution to the discussion of the problem—consist of little but the barest of platitudes, and general statements unsupported by argument or fact. What earthly use is it for Mr. Burt, or anyone else, to state (as if the statement were obviously incontestable and needed no proof) that "it is quite cer- "tain that any benefit which might accrue from a device "of this kind [the checking of coal exports by artificial "arrangements] would bring greater evils than it would "remove"? Very likely; we are not disputing it. The statement is in accordance with truth; but there is far too great a tendency in these days towards mistaking *obiter dicta* for reasoned and proved facts.

Other contributions to the consideration of the situation—such as those of Mr. E. H. Stevenson, in his Inaugural Address to the meeting of the Gas Institute, and Mr. Norton H. Humphrys, in the columns of the "JOURNAL" last week—really help towards a clearer and cooler judgment than, as Mr. Stevenson remarked, has been evinced in some quarters in the Press, or displayed in the public utterances of our leading men. The "JOURNAL" has never taken an alarmist view of the future. We hold that the present difficulty is, if very serious and vexatious, but a passing one; and that history, as well as a careful consideration of the originating causes of the existing state of affairs, points to the certainty of a not far distant

reaction, with a return to more reasonable prices, if not actually to the low level of two or three years back.

The foreshadowings of that inevitable reaction are, indeed, becoming daily more numerous and unmistakable. The exportation of coal, it is true, shows no abatement; for the quantity shipped during the month of May is returned at 4,170,220 tons, as against 3,942,121 tons in the same month last year—when already the upward movement was in full swing. The quantity exported then was nearly 50 per cent. higher than in 1898, in May of which year it was 2,691,020 tons. Yet a careful examination of the situation abroad, as well as of the detailed figures published by the Board of Trade, tends to the opinion that we are not far from the time when the upward movement in coal shipments will cease—the increase being confined to Russia, Germany (with Denmark and Holland), France, and Spain; while other countries are taking less than in 1899, and some even less than in 1898. There is reason to believe that industrial activity in the first-named countries has reached or passed its zenith, as orders are not now coming to hand from those quarters with anything like the recent freedom and frequency. Looking at home, rather than abroad, the signs of a reaction in demand—and after that, of course, in price—are more marked, especially in Scotland, where both shipbuilders and iron and steel manufacturers are beginning to feel very anxious as regards future business. They are busy at present, but new orders do not come to replace those completed; the fact being present prices are simply killing trade.

Mr. Humphrys discusses the question as to whether it is the best policy to meet the higher cost of coal by an increase in the price of gas. It is, of course, impossible to express any opinion one way or the other as regards the industry as a whole; for every individual case must be considered on its facts and merits. But it is at least possible to strongly endorse the opinion expressed by Mr. Humphrys that trying to stave off the evil day by starving the works, and overworking and underpaying the staff, is shortsighted policy, fraught with far-reaching evils. There is, moreover, a good deal in his remark that fair-minded and reasonable men would not greatly resent an increase in price, while they might even think there was something of mystery about the company that could go on charging the same price whether coal were dear or cheap. It must, however, be said that, so far as the second point is concerned, there would be little fear of an agitation against such a company, the accounts of all being open to the inspection of the said reasonable man, who would certainly find that the shareholders were only receiving the benefit of previous reservations of dividend, and the consumers that of an average instead of a fluctuating price.

The present time is undoubtedly by no means cheerful for those interested in gas undertakings; but, to quote Mr. Stevenson's conclusion in regard to the coal difficulty: "If "companies and consumers will only fairly share the "extra burden put on the industry, it will soon pass away, "and only be remembered as a bad sort of dream." In the meantime, for those able to look at the situation dispassionately, we are making very interesting history; and in business, as in private life, times of difficulty are not without instruction, and, if only faced aright, not without ultimate benefit.

The Welsbach Company's Annual Meeting.

THERE was a very large audience indeed when Sir Henry C. Burdett, K.C.B., rose to address the proprietors at the meeting of the Welsbach Company on Friday last. We have often heard it remarked at company meetings that when everything is going well, it is impossible to induce the shareholders to attend; and the crowded state of the Great Hall of the Cannon Street Hotel on this occasion seemed, therefore, to indicate a spirit of unrest. And, indeed, in the course of the proceedings (which, by the way, lasted two-and-a-half hours) much disappointment was expressed by the proprietors at the result of the Company's operations. The Chairman explained that there was great difficulty in comparing the accounts under review with those previously submitted, because the latter covered a period of about sixteen months. So far, however, as they could be compared, it seemed that the net profits of the past year showed a decrease of £42,000. It was pointed out that one of the chief causes of this falling off was the reduced dividend upon the shares held by the Company in the Austrian undertaking. Much, however, is hoped from the new policy which the Board have adopted since the appointment of Mr. H. L. Peters as Managing-Director. This policy consists, as has already been notified in our pages, of a large reduction in the price of the Company's specialities, together with a vigorous endeavour to effect economies in the somewhat heavy expenditure. Time, of course, will be necessary to prove the wisdom of the reductions in price which came into force on the 1st inst.; but it seems only reasonable to assume that they will lead to a very large increase in the Company's business. Sir Henry, at the conclusion of his address, offered, if the shareholders wished it, to resign his position as Chairman of the Company; but the meeting was strongly in favour of his continuing at the head of affairs. General Russell, M.P., moved, and the Hon. Philip Stanhope, M.P., seconded, an amendment to the effect that a Committee of Shareholders be appointed to investigate the present position of the Company's affairs; but as the feeling of the proprietors appeared to be against the adoption of such a course, the amendment was ultimately withdrawn. It was, however, clearly intimated by General Russell that a Committee of Investigation would be again proposed at the next meeting of the Company, unless meanwhile things took a more favourable turn. We venture to hope that by the time the shareholders next assemble, matters will have so far improved as to render the moving of an amendment of this character altogether unnecessary. The system of the Company has enormously benefited the gas industry; and surely there is no reason why it should not prove equally beneficial to the shareholders. Perhaps one of the most hopeful signs is the fact that, under their new policy, the Directors intend to turn their attention to placing the business on an ordinary commercial basis, rather than treat it in the light of a monopoly, as they have hitherto done. There is also Dr. Auer's osmium electric lamp, a sample of which was on view at the meeting. It was stated that this lamp will be ready to be placed on the market in the autumn; and if the results obtained from its general use prove equal to that shown on Friday last, the lamp should prove a valuable asset to the Company.

An Abortive Agitation.

IT is very remarkable how uncommonly fond the latter-day Radical is of compulsory legislation. We are led to make this by no means novel observation by the desperate efforts lately put forth by the "Daily News" to work up a grievance against the present Government in regard to the new Factory and Workshop Regulation Bill. This measure is intended to enlarge the power of the Home Office over dangerous trades. It being very difficult to define this qualification, and many important modern industries being divisible into processes of different degrees of danger, the Government Bill contains a provision to enable the Home Secretary to exercise a discriminating and dispensing power where the circumstances are such as to require it. This elasticity is abhorrent to the Trade Unions. They want hard-and-fast laws and cast-iron regulations. Accordingly, that not very important body, the London Trades Council, memorialized the Home Secretary in this sense. With almost excessive courtesy Sir M. White Ridley directed that the memorial should be answered, and the true intent of the Bill explained; and for this he has been hysterically abused by the "Daily News," which so far forgot its manners as to call the official communication an "almost whining apology." The usual routine of modern newspaper agitation—which so seldom agitates anybody—duly followed. Several Trade Union officials were "interviewed;" and they all formulated their "sound and reasonable objections" to the Government Bill, in terms suspiciously resembling the language previously used by the newspaper writer. This was all very capital. A large and representative body of working-class opinion denounced the central idea of the Bill—the substitution of the Home Secretary's discretion for the express provisions of statute law—and there the matter dropped. Nobody really cared two straws for the ravings of the demagogues of the London Trades Council; and the Home Office was not "one penny the worse" for the onslaught so suddenly made by an Opposition journal in sore need of a Party cry. It would scarcely be suspected, having regard to the terms in which the factitious opposition to the Bill was expressed, that its whole purpose is the better prevention of industrial accidents, and the suppression of those deadly processes which supply the popular

Press with the material for its periodical outbursts against the "Moloch of Capital." An attempt is to be made to attain this object in the most direct way, and the work-people likely to be affected by any new regulations are to be heard on an equality with the employers. Ample protection is thus secured for every interest. This is the dreadful measure which the Trade Unions do not like, probably because of its very practical character, and the precautions taken to avoid grounds upon which grievances might be manufactured. We agree with the opinion of "Engineering," in regard to the reservation of discretionary power to the Home Secretary, that a cast-iron uniformity of rules and regulations for factories and workshops is not within the range of practical politics. But what is that to a set of "Labour" politicians? Of course, of the political aspect of these sporadic outbreaks of Radicalism in association with the Socialists who live by the Trade Union movement, we have nothing to say. The prospect, however, that if this coalition were to attain to any real power in the Legislature, Acts of Parliament would be passed thick and fast for binding national industries in subservience to the Trade Union sentiment of the hour, is not to be overlooked. Mr. Steadman would see to it that the manufacture of carburetted water gas was made felony. Gas manufacture generally is not a dangerous trade; but electric lighting is, in some respects. What a happy, prosperous, and free country England would be, if the Party of Progress had their way!

The Problem of Coal Again.

Once more the problem as to the extent and probable duration of the coal deposits of the United Kingdom has been descanted upon by a President of the Institution of Mining Engineers. Mr. H. C. Peake this year took up the subject where his predecessor in the chair of the Institution, Mr. J. A. Longdon, had left it. He declared himself as not possessed by such gloomy views of the situation, and looked to the enhanced price of coal as likely to influence consumers in the direction of economy, and coalowners in that of putting fresh supplies upon the market. Meanwhile, he agreed that the coalowners are now making up for past losses. It was explained that during the years of poor profit there is no inducement for coalowners to spend money on the improvement of their property. They do just what is necessary to keep the pits open, and no more. Consequently, when times of higher demand come, as at present, the colliery proprietors are not prepared to meet the demand by the aid of mechanical appliances for facilitating an increased output. And, of course, the men will not bring much, if any, more coal to bank. It has been asserted elsewhere that if the colliers would only work steadily for five days a week, the present abnormal prices would soon drop to reasonable proportions. To say this, however, is obviously to convince the men of the folly of their doing anything of the kind. Whether the colliery proprietors can and will do what is indicated as possible to increase the output by mechanical treatment of the coal in and out of the pits is doubtful. Mr. Peake puts the shorter and longer limits of the duration of the British coalfields, as at present worked, at 150 and 350 years. There is not much use in making these calculations. They are liable to be upset by a hundred unforeseen influences. He also mentioned the suggestion that a 5s. export duty should be put upon British coal; but he seems to have shirked the responsibility of treating the proposal magisterially. The general impression left by his remarks on the price of coal, which is the all-important matter, was that the trade will keep rates up as long as they can. More than this rather obvious induction cannot very well be drawn from any of his observations.

WATER AND SANITARY AFFAIRS.

The proceedings at the meetings held last week of the Southwark and Vauxhall and Grand Junction Water Companies, reports of which will be found elsewhere, were not marked by any very striking incidents. Both Companies have, unfortunately, lately been in trouble with Mr. Allen Stoneham, the Official Auditor under the Metropolis Water Act, 1871, over certain matters connected with the accounts; but in one case the objection raised was met without affecting to the extent of a penny the amount available for distribution, and in the other the difficulty will probably be satisfactorily arranged. Both Companies have done very well in the half year covered by their accounts. The Southwark and Vauxhall Company received £137,561 for water supplied, or £3614 more than in the corresponding period of 1898-9; but as the first-named amount included an item of revenue from the East London Company £1995 less than it was in the six months ending March, 1899, the legitimate increase was £5609. The result of the working was a sum of £72,142 to be transferred to the dividend and interest account, as compared with £68,085 a year ago. The Directors recommended a dividend at the rate of 7½ per cent., after payment of which there would be £8732 to be carried forward. The Chairman (Alderman Sir Henry E. Knight) explained that they might have proposed an additional half per cent.; but they thought it scarcely wise to do so in view of the advance in the prices of coal and iron. Mr. F. Tendron told the proprietors of the Grand Junction Company much the same story; but both gentlemen held out the promise of an increase of dividend on the next occasion. The severe frost of a few years ago entailed very considerable expense upon each Company; and this, of course, affected the dividends. In the case of the Grand Junction, an average of 8½ per cent. had been paid for thirteen years up to 1895; but since then the shareholders have received 1 per cent. less. But during this time the Directors have set aside £21,000 as the nucleus of a reserve to meet the extra expense which will come upon the Company when they begin to take water from Staines; and they entertain the confident hope that the normal increase in the rental, without any serious addition to the maintenance and other charges, will enable them to recommend next December the payment of an extra half per cent. dividend. Satisfaction was expressed by both Chairmen at the report of the Royal Commission. As to the London County Council and their doings, Mr. Tendron and his colleagues have come to the conclusion that the more they attend to their own affairs, and the less they trouble about the County Council, except to defend the Company from attack, the better it will be. This is a judicious resolution; but, unfortunately, the exception entails upon the Company, as well as all the others, the expenditure of a great deal of money which might be much more usefully employed.

Sir John Harwood, the Chairman of the Water Committee of the Manchester Corporation, is evidently a man who believes in taking Time by the forelock. Though he acknowledges that Manchester has not arrived at utilizing half of the water which will eventually be furnished from Thirlmere, the consumption is increasing at such a rate that in a very few years the supply at present available will be insufficient for the wants of the city. He therefore asked the Council last Wednesday to sanction the laying of an additional pipe from the above-named lake, to bring in an extra 10 million gallons of water, at a cost of £500,000. The matter is urgent, as the work will require three years for its execution, and there is now a margin of only 2½ million gallons per day. Possibly if Sir John's request had gone no farther than asking for the new pipe—though it seems that it would be much more economical to lay all the four extra pipes contemplated in the scheme while the work is in hand—there would not have been much discussion upon the proposal. But in their report the Committee had the temerity to call special attention to the fact that the supply from Thirlmere is "not inexhaustible for all "time," and that disregard of this circumstance has led, "if not to actual waste, at all events to a very excessive "increase in the consumption." While asking for his new pipe, therefore, Sir John emphasized the remarks of the Committee just quoted, and pointed out the advisability of a more judicious use of water. For this he and his Committee were stigmatized by certain councillors as "alarmists," more especially as they had referred to the increasing number of water-closets in the city, and questioned whether, if this went on, the service would be able to bear the strain. The discussion then turned upon the relative merits of the closet and the pail system. The former conveniences are increasing at the rate of close upon a thousand a year in Manchester, and they cause the use of 64,000 gallons of water daily which was not contemplated when the Thirlmere scheme was devised; and the point which the Council discussed was practically whether or not the order made in 1891 as to the adoption of water-closets should be revised in favour of the pail system. The course suggested was adopted on both sides.

THE INCORPORATED GAS INSTITUTE.

PROCEEDINGS AT THE THIRTY-SEVENTH ANNUAL GENERAL MEETING,

HELD AT THE

ROYAL UNITED SERVICE INSTITUTION, WHITEHALL,

JUNE 12 AND 13, 1900.

Mr. E. HERBERT STEVENSON, M.Inst.C.E., President.

REVIEW OF PROCEEDINGS.

In the height of the strongest heat-wave of the summer and in the midst of a pelting thunderstorm, a numerous company of members of the Incorporated Gas Institute assembled this day week at the Royal United Service Institution, Whitehall, for what must be classified as one of the most momentous meetings in the records of the Society. The President (Mr. E. Herbert Stevenson) took the chair with commendable punctuality, and began the business with an air of good humour and urbanity which augured well for the smoothness of the subsequent proceedings. The subject of amalgamation of the two national organizations was first broached by Mr. W. R. Chester, in moving the adoption of the report of the Council. The accounts revealed a healthy condition of the Institute finances, and were passed without comment.

The President's Medal and first premium for last year's papers went to Mr. T. O. Paterson, of Birkenhead; the second premium, to Mr. T. Newbigging; and the third, to Mr. J. P. Leather.

During the presentation of the awards, Mr. J. W. Helps, the President of the Institution of Gas Engineers, entered the hall, and took a seat on the platform beside the President, amid general applause. Another exceptional incident was the voting of a complimentary presentation of a piece of plate to the Honorary Secretary (Mr. Andrew Dougall), on the termination of his period of five years' service in this responsible and difficult office. This was an exceedingly popular interlude; Mr. Dougall being as well and widely appreciated by the members as he deserves to be, which is saying much. The President then began the delivery of his Inaugural Address.

It commenced very frankly with an admission that the speaker could not claim to have had much prior acquaintanceship with the bulk of the members of the Institute to the chair of which he was called, by circumstances and a somewhat ironical Fate, at a critical period of the history of the organization. It was just as well that Mr. Stevenson should have made this voluntary confession of not being a strong Institute man; because if he had not done so, others might have found occasion to twit him with the fact. As it was, the President threw himself upon his Council and the Honorary Secretary; and by freely ascribing to them most of the credit for whatever benefit to the Institute may be referable to his tenure of the chair, he disarmed the easiest and most obvious criticism on what might be found amiss. It is indeed remarkable that the task of conducting, in the name of the Institute, the most difficult and delicate foreign and domestic diplomatic negotiations that have ever been entrusted to a President of this body, should have fallen to so detached a personality as that of Mr. Stevenson. But possibly there was a gain in this. The President was able to play the part of an *amicus curiæ* to the two national Societies which had shown a strong desire to sink their differences and unite their forces. His experience of parliamentary bargaining and arbitration proceedings must have prepared him for the similar kind of work he had to do for the Institute during his year of office. He was in this respect much better fitted than a strong partisan for the shaping of the external policy of the Institute, although his lack of familiarity with individuals inside the organization was a source of awkwardness in the treatment of particular cases. Still, "there's always a something" in earthly concerns which calls for pardon and speedy forgetfulness.

The President was fain to confess that the technical fare provided for the days of meeting was spare, but cheerfully opined that it would hold out for the allotted time, especially as the question of amalgamation with the Institution would probably excite a good deal of discussion. With this passing reference, the address went on to describe the actual crisis through which the gas industry is passing. This naturally suggested a reference to the circumstances of the industry in 1873, when the then existing system of maximum dividends, with power of revision, so signally broke down. There was a so-called "coal famine" in the land in those days; and it passed away. The President holds the cheerful belief that what has been will be again; and he sees in the present dearness of coal only a transient pinch, which gas consumers and companies must bear together while it lasts. As for the municipalized gas undertakings of the country, the President had little thought or care for them in this emergency. He merely remarked that they could raise the price of gas, and added the cryptic utterance that the long-suffering ratepayer "will now possibly find out how very useful he may be." What did he mean by this? So far as observation yet extends, it looks rather as though it is the poor gas consumer who, as usual, is to be made to bear the burdens of the ratepayer.

It is possible to agree with much that the President advanced to show that the general position of gas undertakings to-day, and their ability to bear the coalowners' "nip," are superior to the state of the same concerns thirty years ago. Probably, however, some may think that this line of argument was not sufficiently worked out. It would have been more convincing had it been supported by some reference to a particular instance, instead of being allowed to rest only upon general principles. The sliding-scale, for instance, looks very different, from the public standpoint, according to whether it is working up or down. The President left the subject open for fuller treatment by himself or somebody else later, and finished this part of his address with a generous laudation of those who, in the present session of Parliament, have succeeded in breaking through the hide-bound prescriptions of statutes regulating the illuminating power of London gas. He is not one of those who are unable to see the significance of the new movement inaugurated at enormous cost and pains by the South Metropolitan Gas Company.

From this matter, the President passed to the subject of the proposed union of the Institute and the Institution. He showed how, in negotiating to this end, he and the Council felt themselves to be acting upon a mandate of last year's meeting. He remarked upon the striking coincidence of his late father, Mr. G. W. Stevenson, having been the first President of the Gas Institute after the reconstruction, and of the likelihood of himself being the last, if the suggested fusion were to take place. These considerations led up to the crucial point, which was the question whether the membership of the Institute, as a body, would support the tentatives of the Council in respect of the reconstruction of a single new technical companionship upon the remains of two abandoned organizations. This question, again, was shown to wholly turn upon the possibility of procuring the acceptance by the members generally of the Fourth Clause of the Memorandum of Association of the proposed new Association. The President did not at all trifle with the point. There was the clause. He read it, commended it, and reminded the meeting that the question was practically passed upon by last year's assemblage. As soon as the Council had agreed upon the clause themselves, they directed the President to bring it under the notice of everybody who might be regarded as likely to be touched by it. This was a peculiarly ungrateful task to impose upon any official personage. Nobody likes disfranchising measures; but they are necessary at times. It is nobody's fault that this is so, least of all those who find themselves under the painful duty of working the guillotine.

This was the position: The existence in the Institute of a particular order of members was recognized on all hands as an insuperable bar to the formation of a new Society. They were invited to consider the situation, and to subordinate any personal desire they might entertain to keep their standing, to the general aspiration towards unity which unquestionably inspires the majority of members of the profession. Many—indeed, most of them, and the best esteemed—saw the expediency of the sacrifice, and they made it. Not gladly, of course. It would have been impossible for Mr. Hepworth and Mr. John West, who have filled the chair of the Institute, and enjoy universal respect and much individual affection, to contemplate the severance

of the tie that bound them to the body they had served so well. But these magnanimous Past-Presidents were equal to the occasion, and gave the highest meed of approbation to the action of the Council by conforming to the spirit of the movement. They did more—they certainly saved the position, so far as safety could be ensured in anticipation of the event.

This part of the address was its culmination. The rest was matter of detail. The proposed title of the new Society was mentioned; and it was explained that the scale of subscriptions for non-elective members will remain the same as of yore. New members coming up for election would be expected to pay more. This explanation brought the brief address to its conclusion. It therefore remains one of the shortest of presidential utterances in the records of the Institute. Nor were the circumstances favourable to the pronouncement of any long discourse upon technicalities. The meeting had but the one subject in mind; and the President was in no way inclined to stand in the way of the discussion. His cue obviously was to put the question of the conduct of these negotiations and deliberations to the test of a vote, without occupying much time in preliminaries. Time pressed; and he had no desire to appropriate the precious moments for a display of his rhetorical powers. It was a wise course in the circumstances—leaving it impossible for any member to fairly complain of a stinted opportunity for debating the points of the proposed settlement. Mr. Stevenson has the satisfaction of feeling that he effaced himself as far as possible, and left the fairest and fullest field for the discussion of the plan of union from every point of interest.

"The Society of Gas Engineers and Managers," as the provisional title for the new companionship, came out for the first time in the course of the address, which was fairly well received.

The vote of thanks for the address was moved by Mr. W. A. Valon, who laid stress upon its businesslike quality. The vote was seconded by Mr. C. S. Ellery, of Bath, who specially acknowledged the public spirit of the President and members of the Council in giving up so much valuable time to, and taking such pains over, the arduous work of the year. The President's acknowledgment of the vote was particularly well inspired and gracefully expressed.

The first motion in favour of amalgamation, as a general principle, was put from the chair, and seconded by Mr. Porter, of Elland. It was supported by Mr. Chester, and passed by a show of hands without a dissentient.

The second resolution was prefaced by the reading of letters from Mr. Hepworth and Mr. West. It was afterwards stated that only three gentlemen still refused to retire from membership in order to facilitate the reunion of the profession. The executive resolution was moved in unexceptionable language by the President, and seconded by Mr. Valon in a highly politic speech, terminating in an almost impassioned plea for unity irrespective of personal considerations.

Mr. C. E. Jones opposed the liquidation of the Institute, as a preliminary to union; holding that the Institute was quite well adapted to fulfil all the requirements of a peripatetic technical society, and should be preserved. He argued for the alternative procedure of the members of the Institution coming to the Institute; and he moved wordily an amendment to the resolution in this sense. All Mr. Jones's supporters avowed their desire for reunion, but objected to the programme of the Council. Mr. W. Carr argued that the price asked for amalgamation was too high. The Solicitor at this point intervened with an explanation that the proposed method of procedure was the only one practicable; and the President ruled that the carrying of any such amendment would quash the whole thing. These strong rulings served to keep the meeting in hand; and the discussion accordingly went forward in order on Mr. Jones's amendment. The President showed firmness and skill in keeping the debate to the point, and refusing to admit disturbing matter. He proved to be a strong Chairman; and he had his reward in a good majority for the recommendation of the Council and against Mr. Jones's amendment, declared to be a direct negative to the original resolution.

This vote being taken after one o'clock, the President insisted on going on with the discussion to a finish. Mr. Chester accordingly moved the delaying amendment recorded against his name, which he supported in an admirable speech. The amendment was seconded by Mr. Isaac Carr; and there was no desire manifested to prolong the discussion. The President accordingly deprecated hanging up the issue for an indefinite period; and the amendment was defeated by a vote of 70 to 60.

Mr. Miles had a further amendment to offer, relating to clause 4, and making its operation prospective. This was supported by Mr. Chester, but opposed by Mr. Valon, who wished the question to be left to the Council. Mr. Ford, of Stockton, speaking as a member of the Council, here gave valuable support to the Chair. This amendment shared the fate of the others, only more so; the figures being 62 for, and 81 against.

The vote was immediately taken on the substantive motion, resulting in its being carried by 82 to 18. This apparently ended a momentous crisis. It only remained to take the vote upon the constitutional question—"That "this Institute be wound up voluntarily." A three-fourths majority was declared to be necessary to carry this resolution; and it was not obtained by four votes. The motion was therefore lost; and the matter fell through. Not absolutely, however, for Mr. D. Irving stepped into the breach, and demanded a poll, which was appointed to be taken in the afternoon, at four o'clock. Thus the business of the morning ended in a thoroughly unsatisfactory deadlock; the last vote being contradictory of the sense of those that preceded it. The meeting adjourned for the luncheon interval with the uncomfortable feeling that it had not comported itself with any conspicuous wisdom.

In the afternoon, Mr. Chester's paper was taken. It is a very useful contribution to the technical literature of coal carbonization, and, in other circumstances, would have made a deeper impression. It nevertheless elicited a good discussion, and was decidedly the most important paper submitted to the meeting.

The discussion was interrupted by the inexorable sounding of the hour of four, at which the ballot on the constitutional question of liquidation was to be taken. There was considerable confusion at the moment; a large contingent of members having so delayed their return as to incur great risk of being shut out from the division. But, eventually, the papers were duly distributed, filled up, and collected; Mr. Martin and Mr. C. E. Jones being appointed Scrutineers to announce the result, which was: For the dissolution, 86; against, 64—26 votes short of the requisite three-fourths majority.

The result was naturally awaited with great interest, as it was understood to mark an era in the history of the Institute. The hall presented a very animated aspect at this crisis; the members all conversing anxiously on the prospects of the division. On the announcement of the figures by the President, there was a dead silence; the discrepancy between the various polls of the day being felt to be anything but creditable to the Institute. So much for the dream of unity!

The conclusion of the discussion on Mr. Chester's paper occupied the first half hour of Wednesday's meeting, and was immediately followed by Mr. Webber's lecture, which proved to be a development of the thesis that the permanent success of the incandescent system of gas lighting reacts upon the manufacture of the gas used, and practically makes it all fuel gas. It was on the lines of the evidence offered in support of the South Metropolitan Gas Bill in Parliament recently.

Mr. Walmisley's paper on "Iron Roofs" was next taken, and was a very instructive statement of the best practice in this line of construction. Mr. Wilkinson's spicy paper completed the work of a busy and profitable morning.

Mr. Young's paper on "Naphthalene" was read after the luncheon interval. Then followed the regular constitutional business of the meeting, which, in view of the circumstances, was of unusual interest. The new President is Mr. T. O. Paterson, of Birkenhead; and Mr. A. Dougall is succeeded in the important office of Honorary Secretary by Mr. J. Davis, of Gravesend. An important variation on the usual order of business was the moving by Mr. Jas. Stelfox of a resolution intended to restore the opening for union of the two Societies which the unhappy vote of the previous day seemed to shut. This endeavour to mend a bad business was warmly received, and cordially supported upon all sides. It was carried without a single dissentient, and with every sign of satisfaction. This was the best that could have been done; and it is to be hoped that everybody concerned will so regard it. Next year's meeting will again be held in London, which will be by far

the most convenient place of assembly in the conditions of the present and coming year.

So the meeting ended with coruscating votes of thanks and also the presentation to Mr. A. Dougall—some of the members to go to Paris the same night, and others to spend the next day at Stonehenge. Both excursions were successful and enjoyable in an eminent degree; and the experiment of dividing the party into two or even more groups, for the general convenience, may possibly be repeated.

THE PROCEEDINGS SUMMARIZED.

[*The usual full Report Commences on p.* 1616.]

Under oppressive atmospherical conditions (which even a heavy storm at the time fixed for the commencement of the proceedings did not mitigate), the members of the Gas Institute assembled in the Lecture Theatre of the Royal United Service Institution on Tuesday morning last. The hall, too, was uncomfortably crowded in anticipation of the sitting being a lively and eventful one. This it proved to be; and in the excitement and interest of the occasion, personal discomfort was a secondary consideration. The President (Mr. E. H. Stevenson) took the chair shortly after 10.30; and a little later he was joined on the daïs by Mr. J. W. Helps, the President of the Institution of Gas Engineers, whose reception attested his popularity among the members of the old Institute.

Formal Business and Presentations.

The preliminary business was quickly disposed of. The minutes of the last meeting were confirmed; and then the annual report of the Council was presented. The adoption of the report (the principal portions of which have already been published) was moved by Mr. W. R. Chester, who made reference to the long list of deceased members, and alluded with particular regret to the loss of the former Secretary (Mr. F. G. Burfield), whom the members held in great regard. He also congratulated the Council upon the advance of the amalgamation question, and the efforts they had made in this direction. Following the adoption of the report, came the awards for papers read at the last meeting. Mr. T. O. Paterson was the recipient of the President's Medal and a cheque for £10 for his paper on "Gas for Motor Purposes." Mr. Thomas Newbigging was awarded a cheque for his paper on "Differential Rates;" but he was not present to receive it. Mr. J. P. Leather also received a similar recognition of his valuable contribution on "Naphthalene Deposits." An announcement by the President that, the term of Mr. A. Dougall's office as Hon. Secretary being about to close, the Council had decided to make a presentation of plate to him, was marked by the warmest approbation.

The President's Address.

The formal business completed, the President delivered his Inaugural Address. The full text was published last week; and some comments upon it appear in the preceding "Review." Therefore it is unnecessary to make mention of its contents here. It was well received, and was characterized by Mr. W. A. Valon, in proposing a vote of thanks to the President, as a very business-like composition. The members' appreciation for it was testified with their accustomed vigour.

The Amalgamation Question—Unity Approved, but the Price too Heavy.

Then the great topic of the day—the amalgamation scheme—was introduced by the President; and the pent-up excitement of some of the members soon found vent. On the whole, it must be said the matter was discussed by the bulk of the speakers with great moderation; but a few little indiscretions were committed in the heat of the moment—and not only in the body of the hall. The principle of amalgamation was approved without hesitation; but the one vital condition was objectionable to a minority of sufficient strength to sacrifice the whole scheme. That condition was the disqualifying clause, which excluded from membership persons "actively engaged in or about the management of business, either as principal, managing director of a joint-stock company, or as agent, or traveller of any trading company, firm, or concern doing business with gas undertakings, whether as vendor or as purchaser." And it was the thought of losing, under this rule, such men as Mr. John West and Mr. J. Hepworth that was the moving and paramount influence. At the outset, the President moved a resolution expressing the desirability of amalgamation; and seconded by Mr. Robert Porter, and supported by Mr. W. R. Chester, it was carried without dissent. The second resolution recorded that it was desirable that amalgamation should be effected by the voluntary liquidation of the Institute and Institution, and by the transfer of all property and assets of the two bodies to a new Society, having a Memorandum and Articles of Association in the form of the draft issued to the members. Before the discussion was opened, the President read letters from Mr. Hepworth and Mr. West. In terms which showed how keenly he would regret his severance from the Institute, Mr. Hepworth declined to allow his personal feelings to bar the way of amalgamation. Mr. West also was unwilling that his membership should be an obstruction; but at the same time he thought some rule might have been framed whereby technically trained men could have been admitted to the new organization. Of the associate members, there were only three, the President stated, who had absolutely declined to resign. He commented on the difficulty of differentiating between gentlemen who were in any way connected with firms trading with gas undertakings; and he also stated the necessities for dissolution and reconstruction. He formally moved the resolution, which Mr. W. A. Valon seconded. While he did not want the rules to be framed in such a way as to exclude for all time such men as Mr. West and Mr. Hepworth, Mr. Valon admitted that the gas profession ought not to suffer because of individual disqualifications. However, he could not see any impossibility in meeting this matter. He finished a well-pointed speech with a stirring appeal to the members not to let differences of opinion stand in the path of re-union. In a speech, in which power and humour were blended in the old, well-known style of Mr. C. E. Jones, that gentleman declared that he yielded to none in his wish to further the best interests of the profession. Yet he could not see the necessity for liquidation; the Institute being well adapted for the reception of their "erring brethren" of the Institution. He argued that the Institution of Civil Engineers would never have been what it is if the great engineers who were, and had been, identified with trade had not been admitted to its ranks. He moved that it be an instruction to the Council to effect the proposed union without dissolving the Institute. Prefacing his remarks by a statement that he was agreed as to amalgamation, Mr. William Carr thought the point they had to consider was the price they had to pay as the parent Institute. There were 518 members in the Institute; and he ventured to say that amalgamation would not raise the number to 600, while 109 gentlemen would be severed from them. He described the circular which had been sent by the President to the associate members as an injudicious one; and he told the President that the 57 assents obtained were given more or less under compulsion. Those gentlemen were willing to retire; but it would be to the everlasting disgrace of the Institute if it were made necessary that day. He failed to see any just reason whatever why the Institute should be dissolved, or the associate members banished at the behest of the Institution. The necessity for the dissolution having been explained by the Solicitor, Mr. W. W. Hutchinson gave it as his opinion that it was an unfair thing to ask the associate members to resign, though he would like to see the re-union accomplished. Mr. W. Hardie, hoped the members would hesitate before nullifying the whole of the Council's labours in this matter. Mr. Robert Fish was sorry separation had ever come about; and a reason for the obnoxious rule being made retrospective was sought by Mr. J. P. Leather. One noteworthy remark of Mr. J. Stelfox was that the trade element should keep in their own place, and that place was not at the meetings of the Institute. In Alderman Miles's judgment, the terms of amalgamation were not equitable. Mr. D. T. Livesey saw nothing in the way of amalgamation that was insurmountable. A most effective and really polished speech was made by Mr. J. Carter, who traced in Mr. Jones's amendment something that was not consistent with the resolution already carried. On the other hand, in the proposal under discussion, there was such a ruthless violation of existing rights as should not be found in any scheme of amalgamation. They should not allow the union to be shattered; but he was extremely anxious that

the interests of the present associate members should be recognized in the amalgamated Society. That some means of reconciliation would be found was the earnest hope of Mr. W. Prince. It was explained by the President that there were 240 members in the Institution, under 40 per cent. of whom were also members of the Institute. An unfortunate incident, causing as it did considerable irritation, was his reference to the difference in position between the men who would be gained and lost. The voting resulted in the rejection of the amendment.

In the hope that the labours of the Council would not be lost, Mr. Chester moved a further amendment composed of the first part of the second resolution, but referring back for the further consideration of the Council the draft Memorandum and Articles of Association. He remarked that he did not believe the members were prepared to pay the price required under Rule 4; and he thought a proviso might be inserted to meet the election of such eminent gentlemen as Messrs. West, Hepworth, and Sugg. The members did not wish to emasculate the Institute by depriving it of its manhood as proposed by the rule mentioned. Mr. Isaac Carr seconded the amendment; but it was also negatived.

Another effort to pour oil on the troubled waters was made by Alderman Miles, who proposed a modification of Rule 4 which would have had the effect of making it prospective instead of retrospective. Mr. Chester seconded; but after a few observations by Messrs. Valon, Ford, and Herbert Lees, this proposal was likewise rejected.

The original motion was then carried by 82 votes against 18. Thus far the scheme had gone through; but it was wrecked on the smallest rock in its course. The final resolution was, "That the Institute be wound up voluntarily," and 95 voted in its favour, and 37 against. The requisite majority in favour not being obtained, it was declared lost. One last struggle to save the situation was made by Mr. D. Irving, who, supported by other members, demanded a ballot. This it was decreed by the President should be taken at four o'clock in the afternoon; and just before that hour arrived, a large number of members flocked into the hall who had absented themselves during the previous portion of the afternoon sitting. Sharp to the hour, the President ordered the doors to be closed; and this instruction bid fair to create a little disorder—in fact, one member charged the President with trying to take a snatch vote. However, the ballot was eventually accomplished; and the voting was 86 in favour of the resolution and 64 against. This was a far worse result than before; and it means that the century will now probably end with the gas profession still in a state of division.

The lengthened time occupied in the discussion of the above momentous question left but a small portion of the day's sitting for the consideration of technical matter—in fact, it only permitted of the reading of Mr. Chester's paper, in which he champions the cause of inclined retorts, and the commencement of the discussion. The paper was entitled

Automatic Stoking and Inclined Retorts.

In the opening paragraphs, a rapid survey was made of the evolution of mechanical stoking to the point at which the West and Arrol-Foulis machines were made commercially successful. Inclined retorts, however, in the author's view, have an economical limit much lower than the power stoker, and are therefore applicable to smaller works. The utmost economical limit of the power stoker is 500,000 cubic feet of gas per day, as against (say) 100,000 cubic feet in the case of inclined retorts at the time of the minimum output. Where the installation is of suitable magnitude, there is not much real difference in the cost of mechanical stoking between inclined and horizontal retorts; but the inclined system has this advantage, that it can be successfully worked when the power stoker cannot enter into competition on account of the smallness of the works. So far, the author's remarks (of which the foregoing is the purport) are preliminary to the main object of the paper, which is to describe an installation of inclined retorts at the Eastcroft works at Nottingham, and also the mechanical contrivances for dealing with the coal and coke, which, he states, "make the installation the most complete of its kind in existence, and render the process of carbonizing in gas-works as nearly automatic as it can be." The house to which the system has been applied is an old one; and the means adopted to effect the conversion from horizontal regenerator settings are explained. The division walls of the settings being only 8 ft. 6 in. apart, it was not possible to get more than seven retorts in a bed; and they were set at an angle of 32°. They are 21 ft. 10 in. long, measured on the incline, and taper from 20 inches wide at the top to 22 inches at the bottom, by 16 inches deep. The charge of coal is 8 cwt. for the through retort, or 180 tons for the whole house when on six-hour charges. The method of breaking, elevating, and distributing the coal in the house is described. Broadly, the arrangement is similar to that ordinarily applied in new installations; and the author does not claim any particular merit for it. The principal novelty of the installation lies in the method of dealing with the coke. In front of the discharging end of the retorts, are two push-plate conveyors, each moving towards the centre of the house, with the return chain carried overhead. Upon the edges of the conveyor trough, a portable hopper and shoot has been devised, to traverse the whole length of the retorts on wheels. The charges of coke are received into this hopper, and are lowered on to the conveyor through a pair of hinged doors in the bottom of the hopper. Without some such arrangement as this, the rapid discharge of the coke from the retorts causes it to fall in a heap and block the conveyor, besides which the coke cannot be properly quenched. When, by the way, the lids of the retorts are opened, the tar falls on to an inclined plate attached to one side of the hopper, and runs down the plate into a bucket provided for its reception. Another feature of the portable hopper is that, if required, it will transmit the coke while hot to the furnaces. From both ends of the house, the conveyor delivers the coke into an elevator fixed in the centre, and it is raised into storage hoppers having a total capacity of 280 tons. From these hoppers, the coke is screened and delivered into trucks as required. The net expenditure for the conversion of sixteen beds of horizontal regenerator settings into a like number of beds of inclined retorts, with all the necessary coal and coke machinery for automatic working, was £20,000. The total saving the author estimates at fully 2s. per ton of coal carbonized, or sufficient to recoup the whole outlay in about four-and-a-half years of 250 working days each.

In inviting discussion, the President complimented Mr. Chester upon having eliminated hand labour so far as was possible in the process of carbonization. Mr. Shoubridge opened by disagreeing that power machinery could be economically used in gas-works with such a small output as 500,000 cubic feet per day. His own experience led him to say that not less than twelve beds could be economically worked by power machinery. It was very gratifying to him that Mr. Chester had adopted the same inclined retorts and charging machinery that he (Mr. Shoubridge) had put down at Salford. The statement of the author that his was the only installation in existence where the whole of the carbonizing from the reception of coal to the transmission of the coke from the works was automatically accomplished, was hardly correct. The same thing was done at Birmingham ten years ago, and in a good many instances in Germany, Denmark, Austria, and Belgium. The portable hopper was the novelty of the installation; and he could quite understand that some such hopper shoot was necessary with the form of conveyor used by the author. But such a hopper was not a necessity in the works under his own control. It was stated by Mr. Tim Duxbury that at Middleton they had in each oven eight retorts, 20 feet long; and when they had three ovens working, it cost them 1s. 2d. per ton for carbonization, six the same, and he thought with twelve it would be the same. Mr. W. A. Padfield inquired whether there was any creeping of the coal in Mr. Chester's installation, and also whether he used a variety of coal. Mr. T. O. Paterson asked the amount the author provided for wear and tear of his plant. Mr. W. Whatmough, referring to the saving of 2s. claimed by Mr. Chester, asked for the cost of labour before this installation was put down. At this point, the discussion was interrupted to take the ballot on the amalgamation question; and, consequently, the discussion suffered. The next morning the only speaker was Mr. C. A. Craven, who remarked that he found with inclined retorts a considerable saving, even with his minimum production, compared with hand labour. Frequently the total cost of labour was only 1s. 2d. or 1s. 2½d. per ton. In the summer time, the cost might get up to 1s. 6d. or 1s. 7d., but the average throughout the year was about

1s. 4d. He had worked inclined retorts three years with very satisfactory results. In his reply, Mr. Chester made some very complimentary remarks with reference to Mr. Shoubridge's work in connection with inclined retorts. He also gave further information as to the screening of the coke. Regarding Mr. Duxbury's statement that he did not find a decrease in the average cost on increasing the number of retorts, he observed that this was contrary to general experience. He (Mr. Chester) used something like thirty to forty different varieties of coal, and he was prepared to deal with any kind likely to come into the works. On his own works, he had not met with the creeping of coal. The apparatus had not been in use sufficiently long to determine the wear and tear; but he was sure it would be less than with power stoking. With hand labour the cost from point to point dealt with by the apparatus described was 3s. per ton of coal carbonized, as against 1s. under the new conditions.

The President next called upon Mr. W. H. Y. Webber for his lecture, to which he had given the obscure title

The New Gas.

As the title stood in the programme, it attracted attention and occasioned some wonder. And the title of any lecture, essay, or paper which does this is a title to be admired; for frequently upon the title depends the extent and depth of interest taken in the discourse or matter which follows. In this instance, nothing in the three monosyllabic words employed indicated the character of the gas upon which Mr. Webber proposed to expatiate; and consequently until Wednesday last the lecture was veiled in a little pleasant mystification. But now that it has been delivered, many would, without Mr. Webber's explanation as to the manner in which he applied the descriptive word "new," be inclined to say that its use was inappropriate; for the gas of which he spoke is that common coal gas which our predecessors made and used. In a sentence, however, he cleared away all ambiguity. "I mean to say," said Mr. Webber, "that while the gas is old, being none other than the honest, unsophisticated coal gas of our fathers, as a resource of the material civilization of the coming century, the gas is new; because it will be produced according to a reformed principle of manufacture, and will be used for a totally new service." His position stated, he reminded his hearers of the aspiration of scientific workers that something which they vaguely qualified as "cheap fuel gas" should be made available for general consumption, as coal gas was for lighting; but he refrained from wearying his audience, and padding his subject, by going over the old ground as to the constitution of the great variety of gaseous fuel proposals to which those aspirations have given birth. He, however, stopped to recall something which had almost, by the passing of time, faded from memory—that was, the advocacy by Sir William Siemens, in an address to the parent Association at Birmingham twenty years ago, of a system of duplex coal carbonization, in which two-thirds of the make should be reserved for sale as illuminating gas, and the remaining one-third be diverted for sale separately as heating gas, and his words (now the more remarkable) as to the heating value of a gas of low illuminating power. In the historic debate which followed, much was said about the desirability of cheapening town's gas; but the discussion proceeded on the tacit assumption that if there was to be such a public service as that of fuel gas, it must necessarily be something totally different from the ordinary town's gas of high illuminating power. Consequently, the idea of a heating-gas branch for gas undertakings fell flat; and for some years it became usual to increase the illuminating power of town's gas, with the idea of giving people good value for their money. This era the lecturer called the Dark Age of the British gas industry. At the commencement of the eighties, the gas industry was really at a perilous pass. Electric lighting was then coming in; and there was nothing in gas-burners to meet the incandescent light on its own ground. The electricians declared that the only proper employment for gas was as a fuel; and events have justified this judgment, albeit in a manner that those who pronounced it neither expected nor desired. Then came the "Otto" gas-engine; and gas cooking-ranges were tentatively taken up by the most progressive gas companies. But they looked very blankly at this small department of their business, and could not see their accustomed dividends in it. Five years later came Dr. Auer von Welsbach's invention. It was this which turned all town's gas into fuel gas without for some time anybody marking the change; and it is scarcely yet realized that its appearance practically made a new gas. To Dr. Auer the gas industry owes the simple, easy, and natural solution of the puzzle that discomfited all the wise and skilful experts at the Birmingham meeting who heard Dr. Siemens hold forth. Passing on, the lecturer directed the minds of his auditors to Germany, where he showed them things "that shall be here in due course." In Germany, there is no patent monopoly whatever in the Welsbach system; and the result has been that for years it has been worked there strictly on the commercial system. The gas companies there, he explained, are able to buy mantles at from a penny to twopence apiece; and the burners cost ninepence. They have also a system of cleaning and maintenance, from the gallery upwards, at a uniform charge of about 6d. a burner. Broadly speaking, wherever the gas companies do their work in a businesslike style, there is now in Germany nothing but incandescent gas lighting. Berlin will have only incandescent gas-burners in the streets; and last year's increase of burners on the books of the German Continental Gas Company was divided thus: Incandescent burners 21,842, flat flame 1895, and argand 98. The replacement of old luminous flame burners by incandescents is going on everywhere with similar rapidity. This being the state of the case, the practical German mind has already realized that the gas manufacturer has for the future to sell fuel gas only. Experiments instituted by Herr W. von Oechelhaeuser, to clear up the question of what relation the conventional illuminating power of town's gas has to its fuel value, with special reference to the performance of the incandescent thorium-cerium mantle, revealed the fact that, as the gas was unloaded of its benzol enrichment, and the normal illuminating power fell, the duty of the incandescent burner actually rose, while the calorific value dropped but very slightly. Almost non-luminous gas was found to be capable of activating the Auer mantle to the tune of 73·668 candles illuminating effect for a consumption of 3·673 cubic feet per hour. Dr. Bunte has corroborated this important record; and so in Germany, the lecturer told his audience, the age of heavy, loaded town's gas is over. To Herr Dieckmann, the Manager of the Municipal gas undertaking of Magdeburg, he accords the honour of being the first to declare for light gas; and now Magdeburg gets gas of no more than 10½-candle power. Although he sets no store by the illuminating power, Herr Dieckmann pays particular heed to the calorimeter testing of the gas. The records supplied by the lecturer of the tests both of illuminating power and of calorific value disclosed two things: First, what a vacillating quality the normal illuminating power of town's gas is; and, secondly, what a good, steady fuel any common coal gas is. Strikes and coal owners' rings not being unknown even in the happy fatherland, Herr Dieckmann proposes to adopt a carburetted water-gas plant, with which, by the aid of a native schist oil, he will make gas of, as near as possible, 8 Hefner power. He has satisfied himself that this gas will possess exactly equal calorific power with that now supplied to the town; and this is all he cares about. "Thus at last," said the lecturer with emphasis, "the photometer has come to play hand-maid to the calorimeter." "If," he added, "this simple circumstance does not prove the completeness of the revolution in gas manufacture I have attempted to describe, I should like to know where to find a better symbol of the change." Another example the lecturer gave in support of the main argument was Bremen. There it has been decided that the new gas-works shall inaugurate the new *régime* of light gas; and, under the new dispensation, there will be no standard of illuminating power. Town after town is actually consenting to be supplied at this moment with gas indicating from 7 to 10 (English) candle power; and they are the most brilliantly lit towns in Europe. In the concluding sentences of his ardent plea for a reformed gas supply, Mr. Webber made the piquant remark: "We poor red-tape bound English will be left in the lurch by the Germans in gas making as in some other things, unless we take a leaf out of their book, and free ourselves from everything that operates in restraint of trade, and to the discouragement of industrial enterprise."

The lecture was received with a very gratifying manifestation of approval. It was described by the President as most interesting and edifying; and by Mr. Stelfox, in

proposing a vote of thanks, as an extremely valuable contribution to the literature of the gas industry. Mr. Hardie, in seconding, made use of similar kindly expressions; but Mr. Isaac Carr regretted that the subject had not been presented in the form of a paper, as it bristled with controversial matter. The President mentioned that Mr. Webber had intimated that he was quite prepared for the matter to be discussed; but time was too short. A grateful acknowledgment by Mr. Webber concluded a very interesting feature of the proceedings.

Retort-House Roofs.

The paper which followed was by Mr. A. T. Walmisley; and it will be found valuable for reference by engineers when engaged in the design of retort-house roofs, as it brings within convenient limits the characteristics and measurements of several types planned by representative engineers. The first few paragraphs of the paper are devoted to some of the general principles followed in retort-house roof construction. Primary importance is given to ample ventilation above the eaves. Then, as a rule, the author states, no glass is introduced in the covering; and very little sunlight is admitted. In the stage-floor house, a greater amount of clear headway is required than in the ground-floor type. A ridge ventilator is generally made to extend from end to end of the building. Ventilating tubes or towers are sometimes added; and every effort is made, in a well-considered design, to provide roof ventilation free from wind currents at the sides of the building. Retort-houses are, as a rule, placed in sheltered positions; and the strains produced in a truss fixed on the side exposed to the wind are greater than the strains produced in a truss fixed on the lee-side only. Mechanical stoking has created a necessity for wider spans than formerly. With inclined retorts, the intermediate hopper causes the height of the building to be greater than in the case of hand stoking; and the span, as compared with horizontal retorts, is not reduced, since, with the double arrangement of benches usually introduced, space is left in the middle for the charging machinery. The chief characteristic of a roof is its principals, which may be triangular, quadrilateral, segmental, or a combined outline. As a rule, retort-house roofs have a straight inclined surface suitable for slate covering. The approximate weights and the kinds of slating used are cited by the author. The slates can be fixed directly on angle-iron laths or Z iron bars, without the introduction of woodwork, by lead pegs or copper or zinc clips. The angle usually given to the rafters averages about 1 in 1½, having a rise of one-third of the span; and this inclination gives an angle of 33° to 34° with the horizontal. Then follow descriptions of several types of roofs; and the author draws attention to their distinguishing features. He incidentally gives the useful rule that a weight of 8 cwt. per square is ample to allow for a roof of 60 feet span, or 10 cwt. for a span of 100 feet, if intended to carry slates on boarding. In roofs of 100 feet or less span, there is no economy in making the parts of steel. The author also comments upon the necessity for having the lengths of the various elements of a roof truss perfectly accurate, in order to ensure satisfactory results. The roofs dealt with include samples of construction from the gas-works at East Greenwich, Bow Common, Newcastle, Folkestone, Sheffield, Luton, Sydenham, Ramsgate, Tottenham, Dublin, Derby, Beckton, and Hartlepool. The measurements and other information which the author has brought together form a serviceable compendium of the latest and best practice in connection with the subject. A large collection of diagrams illustrating the paper were exhibited at the meeting, and we purpose publishing several of them with the text of the communication.

There was an excellent discussion on the paper. It was opened by the President, who, while complimenting the author, thought that some of the examples of roofs illustrated were old, and would not be adopted now. He also related certain of his own experiences bearing on the question. It was considered by Mr. C. E. Jones that cast-iron was a source of weakness in a roof, and should be eliminated; and he asked for the author's views on the point. He also stated that the life of corrugated roofs was very short; and there was no economy in using them. There were many situations on gas-works where light roofs were required; and it seemed to him that uniform types for specified spans would be very useful. Mr. F. W. Cross asked the author whether he could give the members some idea of the strain upon the walls—the outward thrust—of the different types of straight and curved roofs. Mr. F. W. Stevenson would have been pleased if the author had criticized, or called attention to, the weak points in the examples of roofs shown. He objected to the use of copper fastenings in retort-house roofs, as they would be destroyed, while good lead would stand in that position for many years. As to the "dead weight" mentioned by the author, he asked whether it included everything complete. Corrugated galvanized sheeting for gas-works was not suitable for retort-houses or places exposed to fumes; but there were many places where it was useful. For instance, in coal-sheds, where there was a good deal of vibration, nothing could be better than galvanized roofs. By tarring them every other year, they would last for a great length of time. At Sheffield, they had had them in use twenty years. In Mr. G. R. Hislop's opinion, in exposed situations galvanized iron was preferable to slating, on account of the liability to accident by the wind blowing down the slates. He took the precaution of coating corrugated roofs with oxide paint both inside and outside. He believed the use of cast iron in roofs was a thing of the past. Mr. William Carr thought the paper would be of more value to gas engineers for reference in time to come than as a paper to discuss. He had been thinking of adopting a galvanized iron roof, but on hearing the author's remarks, he felt he would have to hesitate; but from what they had heard from Mr. Fletcher Stevenson, he thought the galvanized roof would have to go on. Several criticisms were made by Mr. J. H. Crowther, who considered it most desirable to use a suspension rod to keep up the tie-bars in the centre of the roofs. A very light one was all that was necessary. Nothing had been said about wind-ties in connection with the bracing of these roofs. Slated roofs could be constructed so that there need be no fear of danger, no matter how much exposed. Mr. T. O. Paterson said he had slated retort-house and purifying-house roofs which had been in use fifteen years; and he had not had a slater on them since they were erected. Mr. S. W. Durkin next recounted his experiences, in roof construction, and added that he had a galvanized roof which had been in use now some years; and it did not cost him a penny except for an occasional coat of paint outside. In working out weights and strains, Mr. Ellery was of opinion that they should not draw the matter too fine. He also advocated the putting of a little more weight in roofs, rather than multiplying the members and joints. He was now erecting roofs on girders; and the question had occurred to him as to how far—in connection with expansion and contraction—they should tie up the roofs to the walls and girders, and how far they should give them play. The usefulness of papers of this kind to the younger members of the profession was borne witness to by Mr. Arthur Valon. Replying to the discussion, Mr. Walmisley said the question of the use of wind-ties was mainly effected by the situation of the roof. Cast iron should not be introduced in any member which was likely to be subjected to tensile strain. The "dead weight" which he had mentioned was simply the framework, and did not include the covering. The question of the strength of roofs depended much upon the requirements of the situation. Speaking generally, it did not do to cut down the sections too fine; and he thought it best to allow an excess of metal for deterioration. He did not care for galvanized iron; and he would sooner use corrugated iron, and give it two coats of iron paint. A good designer always took care that every part was available to the painter's brush. He also agreed as to the advisability of reducing the number of members in a roof. Arched roofs were suitable for large spans; but it must not be supposed that, even with the adoption of a semicircle, they could avoid outside thrust entirely.

The next paper was submitted by Mr. John Wilkinson, and it dealt with

Some Disputed Points among Gas and Water Experts.

From beginning to end the paper is an impeachment, from the point of view of an outsider, of the present system of expert evidence in connection with parliamentary and arbitration proceedings. The author finds it impossible to account for, or to reconcile in any way, with any degree of satisfaction, the wide differences in the opinions of professional experts. In parliamentary contests, the points upon which the main differences arise are too well known to

readers to need recapitulation. As the author points out, a company's experts are called to prove by figures that their requests are most reasonable, and that they cannot carry out their obligations with anything less; while the local authority's experts stoutly deny this, and urge considerable reductions. There is finally such a juggling of figures and facts that the majority of Parliamentary Committees must, he thinks, really feel bewildered by them. In his opinion, the heavy expenses involved in these proceedings are dissipated without any benefit whatever either to the consumers or the ratepayers; and the liability for this he deliberately sets at the doors of the local authority experts. Dealing presumably with a hypothetical case, in which a Company's Bill has passed a Committee with modifications, he says: "In all probability, the Gas Company's experts would have advised them to accept similar terms to those which the Parliamentary Committee had granted; but knowing full well the procedure adopted by experts engaged for local authorities, they were bound to protect themselves by asking for a good deal more than they desired, or expected." The author discusses at some length parliamentary and arbitration proceedings for the transfer of gas and water works. He calls attention to the contradictory evidence as to the so-called precedents of compulsory expropriation; but as "JOURNAL" readers have time and again been told, there are no cases of compulsory purchase of gas-works which have received the confirmation of both Houses of Parliament. The questions as to a company being willing sellers, the amount due for compulsory purchase, the number of years' purchase, prospective value, surplus plant, and other matters were all cited by the author as points upon which the most diverse views exist among experts. A table which he has collated showing actual differences of opinion under seventeen different heads should, he thought, be sufficient to convince experts of the error of their ways; but it did not convince those at the meeting. The real object of the paper, he said, was to elicit the opinions of the "experienced members of the Institute as to whether or not they consider as satisfactory the present basis upon which experts are compelled [?] to give evidence." Notwithstanding all he previously says, he asks, "Whenever recourse is made to Parliament or arbitration, do experts give their evidence on the basis of justice or equity to all parties concerned?" He does not directly reply to the inquiry; but he is fully convinced that the whole system needs quick and drastic reformation. He further inquires, "What is there to prevent" the experts "from meeting together and fixing standard facts and precedents, and firmly adhering to them no matter which side they represent?" The reply to this is simple enough; but the author thinks, if it could be done, the experts would gain the confidence of all parties. The author was also desirous of eliciting an explanation of why the costs incurred in parliamentary proceedings did not follow the event, as in legal proceedings. The paper presented quite a sheaf of points for comment of a very engaging character.

If Mr. Wilkinson did not instruct, he certainly amused his audience by his pointed statements. There was much laughter when the President opened the discussion with the remark that the paper had been exceedingly interesting to him. He showed that the author did not understand what local authorities were like. In his (the President's) own practice, he always tried to make people agree if possible, as better terms were obtained than by fighting. He did not think the poor experts were so bad as they were painted. They must represent their clients, and do the best they could for them. Circumstances varied in every case; and it was these circumstances which caused the differences. "Now, Mr. Valon!" called the President; and Mr. Valon responded by saying, among other things, that the paper was no doubt honestly written from the point of view of the writer; but it was erroneous from beginning to end. There were no two works in the country that could be said to be of the same value unless they were on all-fours. Admitting that the conclusions of Mr. Wilkinson were wrong, Mr. Leather said there was at the same time a good deal of truth underlying the paper. What troubled the author was that two experts dealing with the same company did not come to anything like the same decision. The only remedy was for the tribunal who were considering a Bill or other matter to call in expert witnesses to advise them, and to consider the question without either side calling witnesses. Mr. Herbert Lees did not think the author had been quite fair to the experts. Alderman Miles failed to understand some of the statements in the table supplied by the author. Mr. R. G. Shadbolt congratulated the author upon bringing the paper forward. As to the great divergencies of opinion which were often found, they were no doubt due to the point of view the experts took, and quite honourably. As to the costs of parliamentary applications, it did seem a great hardship that a comparatively small concern should be mulct in costs of perhaps the same amount as a large concern. The reason why the author had arrived at some of his conclusions was, in Mr. Chester's opinion, that he had not followed the cases far enough. If he had looked into the cross-examination of the witnesses, he would have found that many of the points were perfectly understandable. He explained how some of the divergencies arose. Replying, Mr. Wilkinson observed that the experts who had spoken had not explained why one expert valued an undertaking at £55,000, and another engineer at £22,000. There was no doubt the experts did give their evidence honestly in the circumstances under which they were compelled to give it at present—that was, that each had to do the best he could for his clients.

At a length which defies the abstracter to give within reasonable compass a fair indication of the vast amount of information imparted, Mr. William Young discussed in the succeeding paper the subject of

NAPHTHALENE FROM RETORT TO POINT OF DEPOSITION.

In Mr. Young's absence, Mr. T. Glover kindly read the communication. Introducing his subject, the author mentions the generally accepted view as to the reason why naphthalene causes such a large amount of trouble during the manufacture and distribution of gas—viz., that, at all ordinary temperatures, it passes directly from the state of vapour diffused through the gas to that of a crystalline solid. The difficulties are further accentuated by the naphthalene being deposited in thin laminated or feathery crystals, a small weight of which will occupy a large space, and on account of their lightness are liable to be drifted or blown forward until they become entangled in the narrower passages of the service-pipes. It is not so well known and recognized that the same cause—the direct assumption of the crystalline form from the vapour, and *vice versâ*—to a a very considerable extent accounts for the naphthalene vapour being present in the gas so as to produce the trouble. To get a clear conception of how such results are brought about, the author minutely examines certain conditions which prevail, and some of the physical and chemical forces brought into play, during the processes of condensation, purification, and distribution. The interested reader will turn to the full text of the paper (when published) for Mr. Young's studied views on these questions. Sufficient is said to show the important part which the crystalline condition of naphthalene plays in producing the troubles experienced from the presence of the napthalene vapours in the gas, and also to show that the apparent eccentricities of the behaviour of naphthalene are in perfect harmony with well-known physical laws. The naphthalene which is the source of trouble may, the author asserts, have been produced at the works weeks or even months before; and it may during the interval have been travelling forward by a series of successive crystalline depositions from, and evaporations into, the gas until it reaches the place where it is finally deposited, and occasions trouble. The remedies for these troubles are: (1) The removal of the naphthalene vapour from the gas, or at least such a quantity of the vapours as would prevent them from being deposited during the subsequent distribution of the gas; (2) the addition to the gas of something that will prevent the naphthalene vapours in the gas from being distributed in the crystalline form. The dense oils obtained by the distillation of the condenser tars, and freed from naphthalene, furnish an excellent solvent for naphthalene, as well as for the other hydrocarbons diffused through the gas. If, however, the benzols and other high-tension vapours obtained from the distillation of the tars are returned to the dense oil, the solvent power of the dense oil for the benzol and other high-tension vapours present in the gas is balanced, and the solvent power of the oil is thus restricted to dissolving out naphthalene. The application of dense oil so prepared to the naphthalene-charged gas (after the fashion of the prepared ammoniacal liquor or solvent water in the case of

ammonia) would, the author says, perfectly remove the naphthalene vapour from the gas. The second remedy or preventative is to evaporate into the naphthalene-charged gas such a quantity of liquid hydrocarbon vapours (having vapour tensions approximately the same as that of naphthalene) that, when the temperature of the gas falls so low as to cause the vapour of the naphthalene to be precipitated, there will simultaneously be condensed such a quantity of the vapours of these liquid hydrocarbons as will take up the precipitated naphthalene in solution. The author suggests as a ready means of obtaining a supply of hydrocarbon liquid the carbonization of a portion of the gas coal at such a low temperature as will produce liquid tars comparatively free from naphthalene, but rich in vapours having vapour tensions similar to that of naphthalene. The naphthalene-charged gas, when mixed with the hot gas and products from the coal carbonized at the lower temperature, has the major part of the naphthalene vapour dissolved out by the liquid tars as these are precipitated; while at the same time, the gas takes up in diffusion the vapours of hydrocarbons which have tensions approximating to that of naphthalene. These are present in large quantities in the low-temperature products; and, during the distribution of the gas so treated, they prevent any naphthalene which may remain from being deposited in the crystalline form, for these vapours condense along with it, and take it up in solution. Where it is desired to effect the removal of naphthalene and at the same time raise the illuminating power, the use of benzol is advocated, or the carbonization of cannels at a lower temperature than that employed for gas coal. (The latter suggestion, it will be remembered, formed the subject of a paper and discussion at the recent meeting of the Institution of Gas Engineers.)

Contrary to the general rule when the subject of naphthalene is brought up, there was little discussion on the paper. Mr. J. P. Leather informed the members that the experience which he gave them in his paper last year had been confirmed since. It was possible to take naphthalene very thoroughly out of gas without deteriorating its quality. Mr. J. W. Morrison gave his experiences at Sheffield. There they were practically free from naphthalene. They had been using at all the stations the test brought out by Dr. Colman; and they had found no trace of naphthalene from the works. When they did get trouble, it was generally worse in the hilly districts, or where the mains ran to an end. He had been conducting experiments in passing gas containing naphthalene through the lighter tars—the tars taken from the foul main and condensers; and, so far, the results had been very satisfactory. Mr. Glover, in reply, was glad Mr. Leather's further experience confirmed that laid before the members last year. Mr. Morrison, by his experiments in washing gas with thin tars, would eventually find he could cure all trouble from naphthalene.

This concluded the technical matters before the members.

The New Office-Bearers.

The report of the scrutineers was next read; and the names of the gentlemen who will hold the reins of the Institute during the coming year were received with marked approval. Mr. T. O. Paterson will be the President; and Messrs. S. W. Durkin and A. Dougall, the Vice-Presidents. Messrs. T. Bower, W. Carr, W. S. Haddock, and T. P. Travers are to be the new members of Council; and the Honorary Secretary is now Mr. J. Davis, of Gravesend. The nomination of the President of the Société Technique and Mr. Alfred Lass as Honorary Members was heartily acquiesced in.

The Union Question not Dead.

After the commotion at the previous day's meeting, Mr. Stelfox had a surprise in store for the members. At this juncture, he rose, and stated that, as the result of conversation with a number of members, he found what the general feeling was (as it undoubtedly was the previous day) that union should be carried out; and he thought it would be unfortunate if they left the matter where it then was. He therefore proposed a resolution placing on record the members' appreciation of the labours of the Council in endeavouring to bring about amalgamation, and earnestly requesting them to continue their efforts to secure a satisfactory agreement, and to call another meeting of the Institute to consider and vote upon their proposals at the earliest possible moment. Mr. W. A. Valon seconded the motion; and speeches in support of it were made by Messrs. Chester, Ellery, William Carr, Paterson, Miles, Hutchinson, Durkin, Carter, and A. Dougall. Their remarks will be found fully reported elsewhere. It was generally felt, using the words of Mr. Carter, that the resolution was one that the circumstances of the moment rendered absolutely necessary, seeing that the position as it was left the previous day misrepresented the actual feelings of the members. The resolution was carried without dissent, and with much enthusiasm.

Concluding Matters.

London was again selected as the place for the holding of the next annual meeting. Among several formal votes of thanks was one acknowledging the considerate arrangements made by the Société Technique and the Paris Gas Company for the reception of the members who were about to visit Paris. The most pleasing event of the final proceedings, however, was the presentation to the retiring Honorary Secretary (Mr. A. Dougall) of a silver salver and a case of dessert knives and forks, in recognition of his services during the past five years.

In this peaceful way, a meeting which had been prolific of incident was brought to a close; and the members separated—some with the view of preparing for the Paris trip, and others to amuse themselves, or to depart to their homes. Many of those who remained in town participated in the excursion to Stonehenge on Thursday.

GENERAL REPORT.

The Thirty-Seventh Annual General Meeting of the Institute was held on Tuesday and Wednesday last week, in the theatre of the Royal United Service Institution, Whitehall—Mr. E. Herbert Stevenson, M.Inst.C.E., in the chair.

Confirmation of Minutes.

The President opened the proceedings with a few brief words of welcome to the members, and expressed the hope that they would be as unanimous as possible in dealing with the matters coming before them. He then suggested that the minutes of the last meeting be taken as read; and this was agreed to.

Mr. J. P. Leather (Burnley) moved, and Mr. R. Watson (Hertford) seconded, the confirmation of the minutes; and the motion was at once carried.

The Report and Accounts.

Mr. W. R. Chester (Nottingham) moved that the annual report, which had already been circulated (see *ante*, p. 1435), be received and adopted. He expressed his regret to see that the list of deceased members was longer than usual, and his sorrow at the death of Mr. Frederick G. Burfield, of Tunbridge Wells, their former Secretary, whose kindness and urbanity were known to all. The financial position of the Institute appeared to be very satisfactory, there being a balance of £252 14s. 10d. on the revenue account, which was a pleasant change from the state of affairs which prevailed for so many years, when they had great difficulty in making both ends meet. He saw that there was a cash balance at the bank of £501; and he thought it would be well if the Council took steps to invest at any rate a portion of this amount, so as to add something to the income of the Institute. The Council were also to be congratulated on the efforts they had made towards effecting an amalgamation of the two Institutes, in which, he held, they had rightly interpreted the feeling evinced at the last annual meeting, when the two chief agents in the disruption shook hands over the Presidential chair.

Mr. W. Ewing (Hamilton) seconded the motion.

Mr. C. E. Jones asked where the property of the Institute was located. Was it quite safe from risk of fire?

The President replied that it was in the strong-room at the bank, and was about as safe as it could be.

The motion was carried unanimously, as was also one for the adoption of the accounts.

Awards of Premiums.

The President then presented the premiums awarded by the Council for papers read at the last meeting, as follows:—

First Prize (£10 and the President's Medal).—To Mr. T. O.

Paterson, of Birkenhead, for his paper on "Gas for Motor Purposes."

Second Prize.—To Mr. T. Newbigging, of Manchester, for his paper on "Differential Rates as between Consumers of Gas for Lighting and for Purposes other than Lighting."

Third Prize.—To Mr. J. Petty Leather, of Burnley, for his paper on "Naphthalene Deposits: Their Cause and Prevention."

Mr. PATERSON and Mr. LEATHER briefly acknowledged the honour conferred upon them. Mr. Newbigging was not able to attend the meeting.

PRESENTATION TO MR. DOUGALL.

The PRESIDENT said Mr. Dougall, the Hon. Secretary of the Institute, had now completed his five years of office, during which time he had advised the Presidents and Council with great ability and courtesy. He was known and respected by all; and the Council felt that, after such a period of work, they ought to show their appreciation of his services. They had therefore decided to ask the sanction of the members to the presentation of a piece of plate to Mr. Dougall. The matter had been left in his hands; and, feeling sure that the members would heartily fall in with the suggestion, he had communicated with Mr. Dougall, and a piece of plate (a silver salver) and box of knives and forks had been selected by that gentleman and Mrs. Dougall. He was sorry to say that, owing to the intervention of the holidays, the manufacturers had not been able to send the testimonial, properly inscribed, that morning; but he hoped it would be there in the course of the day or on the morrow, when it would be formally presented, and when Mr. Dougall would have an opportunity of expressing his thanks. In the meantime, he would ask the members to express their approval of the action of the Council.

A unanimous round of applause showed that the members present cordially endorsed Mr. Stevenson's remarks.

PRESIDENT'S ADDRESS.

The PRESIDENT then delivered his Inaugural Address, which was given in the "JOURNAL" last week (p. 1542).

Mr. W. A. VALON (Ramsgate) moved a vote of thanks to the President for his address, which he said was one of the most businesslike addresses he had ever listened to. It seemed to him quite natural that someone of the name of Stevenson should occupy the chair of the Institute. His father had done so before him, and the President was a worthy successor. Being a comparatively young man, they might hope that for many years to come they would have his benefit of his advice and assistance, either for the new Institute, if it was formed, or, if unfortunately the scheme for amalgamation fell through, for the old one. There was no need to say anything in support of the motion; but he might add that they not only thanked the President for his address, but also sympathized with him in the difficult work he had had to perform during the year, as shadowed forth therein. They knew there was no more arduous task than that of framing rules for the guidance of men, not only in the present, but in the distant future.

Mr. C. S. ELLERY (Bath), in seconding the motion, said it was very gratifying to listen to the hopeful anticipations set forth in the address as to the prospects of the gas industry; but certainly the existing condition of the markets afforded a strong reason why the industry should present a united front against—he would not say its enemies, but those who were certainly not doing their best to aid it. They must all remember that a great deal of the President's time must have been occupied during the year in bringing forward the scheme of amalgamation now before them; and he (Mr. Ellery) should like to assure him that, whatever difference of opinion might be manifested later on with regard to matters of detail, they all appreciated the pains and trouble he had taken over this matter.

The motion was carried by acclamation.

The PRESIDENT, in responding, said his year of office, with all its hard work, had been well rewarded by the vote of thanks, and the way in which it had been passed. He had done his best for the good of the Institute and the profession; and he hoped he had not altogether failed. He was glad to find that his efforts were appreciated; and he thanked the members very warmly for their confidence and sympathy.

THE PROPOSED AMALGAMATION.

The PRESIDENT said they had now to discuss the matter with which he had dealt at some length in his address. As the first resolution was one with which he thought all would agree, he would simply move it without further remark: "That it is desirable that the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers be amalgamated."

Mr. R. PORTER (Elland) seconded the motion.

Mr. W. R. CHESTER (Nottingham), in supporting it, said he felt sure there would not be a single dissentient voice with regard to this resolution, though there might be some difference of opinion as to the terms on which the amalgamation should take place.

The resolution was then put and carried *nem. con.*

The PRESIDENT said before putting the next resolution he would read two letters which had been sent to him from Mr. Hepworth and Mr. West—the latter being accompanied by a request that it should be read to the meeting. Considering the position Mr. West occupied, it was only right that his letter should be read. He would first, however, read Mr. Hepworth's:—

WHITEHALL CLUB, S. W.,
11th April, 1900.

My dear Mr. President,—I have, as you rightly say in your letter of the 9th inst., which has been forwarded me here, already expressed my readiness to resign my position as member of the Gas Institute if such a step would in any way promote the interests of the Institute, or facilitate the movement in favour of the amalgamation of the two Institutions now representing the gas industry.

I have always regretted the division which took place some years since, and did what I could to prevent it; and I trust that anything that can be done honourably to bring about a re-union may now be done.

I shall naturally regret my severance from an Institute with which it has been my pleasure to be so closely identified in the past; but I should not for a moment allow my personal feelings to prevent my taking any step in the interests of the Institute. Therefore I shall gladly forward my resignation whenever required—on the grounds above stated.

I am, Yours faithfully,
J. HEPWORTH.

The letter from Mr. West was in the following terms:—

BARFIELD HOUSE, WEST DIDSBURY,
MANCHESTER, 31*st May*, 1900.

To the President and Council of the Gas Institute.

Gentlemen,—With reference to the correspondence I have had with your President asking me to resign my position as a member of the Gas Institute in order to facilitate the amalgamation of the Gas Institute and Institution of Gas Engineers, I have given the matter more careful consideration, and, in the first place, wish to lay before you my reasons for declining to resign, as indicated in my letters.

1.—I was articled to a gas engineer, and have been connected with the profession for 45 years, during which time I have filled several important positions to gas companies and corporations, and at the present time am acting as consulting engineer.

2.—I have been a member of the Gas Institute for 31 years, having occupied the position of President, and am at the present time one of your Trustees.

3.—I am a member of the Institution of Civil Engineers.

For these reasons, I considered it was very uncomplimentary to myself and the Institution of Civil Engineers in asking me to resign my membership; but, after very careful reconsideration of the matter, I lay before you the following suggestion:—

I consider that in framing the rules of the proposed new Institution a rule should have been arranged to include men who have been technically trained and have similar qualifications to myself, inasmuch as there are a number of engineers who are eligible to become members of the new Institution presumably occupying the positions of gas engineers to corporations and companies, but who are connected with trade quite as much as myself; the only difference being that, while I devote the majority of my time to a trading concern, they have sufficient time at their disposal to attend to their duties as engineers to corporations or companies, and arrange for other contractors to manufacture and introduce their inventions; and I would suggest that a rule could still be framed which would allow of those gas engineers connected with trade who are members of the Institution of Civil Engineers to become members of the new Institution.

I am, as most of you are aware, not opposed to amalgamation—in fact, it has always been my great desire that this should take place, and while President of the Gas Institute, I endeavoured to further this object. At the same time, if the fact of my being a member of the Gas Institute stands in any way as an obstruction to the amalgamation of the two bodies, I am quite willing to resign, and you can accept my resignation; in

which case I should like you to lay this letter before the meeting of the Gas Institute next month.

Wishing you and the Council every success with the proposed amalgamation,

Yours faithfully,

JOHN WEST.

After reading these letters, he might say there were only three gentlemen left who absolutely declined to resign. It was true that one of them was a man of very great ability, who had rendered important service to the gas world in the past, and yet he was, and always had been, engaged in trade. It was not that he looked down for a moment on trade, which was the backbone of this country, and without it those present would not occupy the position they now did. The men in trade were as honoured as men anywhere, and stood as high in the opinion of the country and in the affection of the people. But it came to this—they could not ask one man to retire, or exclude one man, from an association when they did not ask another to do so who was in exactly the same position as to his occupation, and in almost the same position as to his ability. They could not differentiate between men of this character; and they had therefore been compelled to take the step mentioned in the next resolution, that of liquidation—dissolving the Institute, and reconstructing it and the Institution of Gas Engineers in another Institute which it was proposed to call "The Society of Gas Engineers and Managers." He had a letter in his pocket from Mr. Helps to the effect that the question of title was absolutely left to the Institute to determine. There were legal difficulties about keeping either of the existing titles. The Board of Trade would be pretty sure to cause trouble if an attempt were made to register a new Institute, having either of the existing titles, while the old body was in existence; but the new Society must be formed before the old one was dissolved, so as to hand over the property to it. The chief point in the new rules was clause 4, which he had mentioned in his address; but, after having read the letters from two of the most eminent men who would be excluded under the rule, and who said they were desirous of retiring rather than that the amalgamation which had been brought so nearly to a conclusion should be wrecked, he thought they would all see that there was no one who would really be injured by the dissolution of the Institute, and the incorporation of a new Society. He would therefore move: "That it is desirable that such amalgamation be effected by the voluntary liquidation of the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers, and by the transfer of all the property and assets of these two Societies to a new Society, to be registered under the 23rd section of the Companies Act, 1867, by the name of 'The Society of Gas Engineers and Managers (Incorporated 1900),' having a Memorandum and Articles of Association in the form of the draft issued to the members, and produced to, and approved by, this meeting, and identified by the signature of the President, subject to such alteration (if any) as may be approved by the Council."

Mr. VALON said he had great pleasure in seconding the motion. He had been somewhat relieved by hearing the letters from Mr. Hepworth and Mr. West read. In seconding the proposition, he must say he did not wish the rules of the Society to be formed in such a way that for all time men like John West and Joseph Hepworth should be excluded from it. If the difficulties were too great to be overcome, and if no arrangement could be made by which these gentlemen might be admitted into the new Society as members, then, as the lesser of two evils, they must leave them outside, because the body of the industry must not suffer because of individual disqualification. It was from this point of view that he should like to approach the consideration of the subject. If it were not possible to admit them, and only in that event, should they be obliged to leave outside the names and persons of these gentlemen, who had now been associated with them as Presidents and members for so many years past. He could not conceive that it was impossible. He could, of course, perfectly understand, by the terms of the clause to which the President had referred, that it would be impossible; but he certainly did think some modification of it might be made by which these gentlemen should be included. They all knew the action he took when this unfortunate split occurred. But if counsel, if solicitors, if all the information they could get, showed that there was no way of including these gentlemen, it was their duty to the profession, however painful it might be, to leave them outside—still to be always honoured by invitations to attend the meetings, so that the position they all deeply regretted might as far as possible be ameliorated. There was a provision in clause 8, under which, if a member ceased to hold a qualification, he was, or might be, removed; and he (Mr. Valon) thought the word "may" in that clause should be "shall." But if a man had a qualification to be elected a member of the Society, he did not see how his entering into any other profession affected his qualification as a member of the gas profession. A member of the Institution of Civil Engineers might go into any other business—he might keep a grocer's shop—but he was still a member of the Institution; and there was no reason that he could see why, if he had the qualification, he should be expelled. There again, however, he bowed to the decision of the Council and their advisers. If it were necessary that such a clause should remain, let it remain rather than the good of the profession should be prejudiced. There was one other small matter; and that was the question of students. He noticed that, quite rightly, there were to be students. But he could not help thinking that the clause relating to this matter was very badly drawn. It said first of all "any person being or having been a pupil of a living member;" and then, further, he was to be recommended by that member. If the member was not living, he (Mr. Valon) could not understand how he was to recommend the student. But what he found fault with most was that there should be no qualification for the student. He did not know of any Society of importance that did not demand of all its students some kind of qualification. It appeared to him that before a student could be accepted by the Council, or recommended by a member, he should be possessed of some educational qualification, such as it would be necessary for him to possess, otherwise his studentship would be a farce; and he (Mr. Valon) would suggest the insertion of some words to carry this out. He sincerely hoped that no difference of opinion would prevent the reunion of the two Institutes; that no feeling, however strong, would run high enough to induce members to vote in such a way that there should still be two bodies representing one industry. Let them unite, and when united, if the members wanted alterations in the rules or regulations, it should be in their power to make them. The only point to be careful about was that the articles were such as left them perfect freedom for the future; and he was sure that, after the experience of the past, they would be too cautious in admitting members to ever have to go again through the farce they were now engaged in. He sincerely urged upon everyone to make this a personal question, and see that nothing interfered with the amalgamation of the two Institutions.

Mr. C. W. HASTINGS (London) said it seemed to him that there was a way out of the difficulty with regard to gentlemen like Mr. West and Mr. Hepworth; for among the old rules there was one which allowed the election of honorary members, and if ever two gentlemen deserved to be honorary members of the Institute, they were the two whose letters had been read that morning. The Articles of Association (clause 7) provided for the election as honorary members of the Society of any persons who were eminent in science, combined with experience in pursuits connected with the gas industry; and it seemed to him these two gentlemen fully complied with this clause. He thought there was no reason why either the old Institute or the new one should not elect them as honorary members.

Mr. VALON thought Mr. Hastings had not read clause 4, which would exclude these gentlemen, as being traders.

Mr. HASTINGS said there was one distinguished honorary member at present, Mr. William Sugg. Were they going to turn him out? (SEVERAL VOICES: "Yes.") He was sorry to hear it.

Mr. J. KEEN (Wigan) asked if it were permissible for him, as an associate, to speak on this question.

The PRESIDENT was afraid that they could not depart from the rule that only members might take part in the discussion.

Mr. KEEN said in that case he would only ask to be allowed to state that, although he had been an associate for twenty years, he was quite willing to resign, though he had not written in reply to the application which had been sent to him.

Mr. C. E. JONES (Leyton) congratulated the mover and

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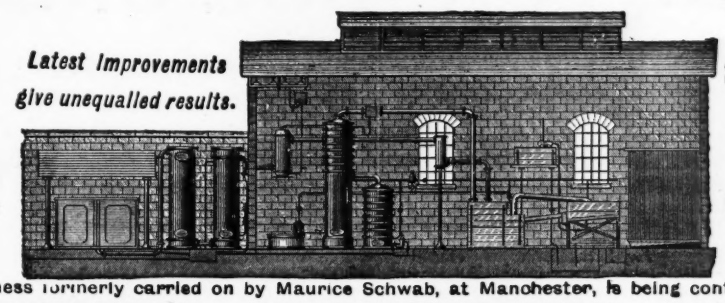

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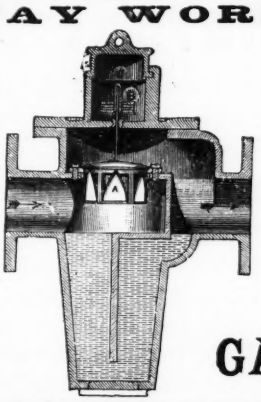

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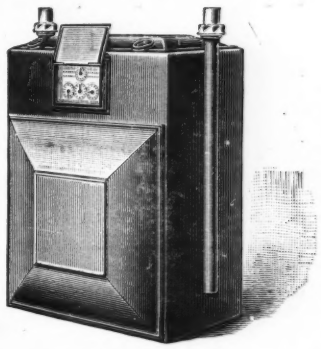

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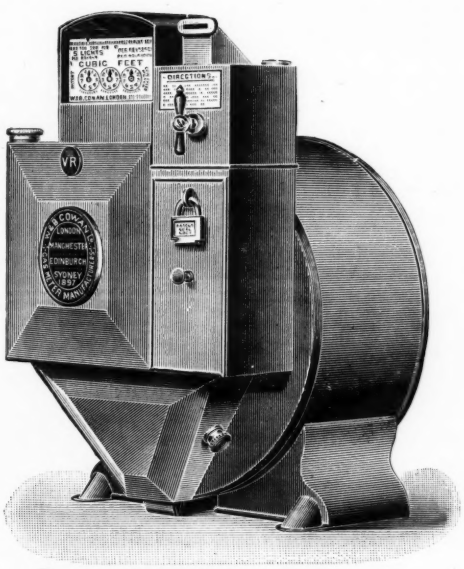

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seconder of the motion on the extreme courtesy and goodwill which clothed their remarks, and the evident anxiety they felt to bring about an amalgamation between what were now called the two rival Societies. He claimed that he was quite as sincere in his desire to bring about this re-union as anyone; and he yielded to none in his wish to further the best interests of the gas industry. It was not a pleasant thing at any time to find oneself in conflict with the constituted authorities; and as he had voted for the former resolution, he should hope for a little consideration while he discussed the liquidation of the Institute as now proposed. He saw no necessity whatever for liquidation, and could not imagine what they would gain by it. They were actually asked to assist at their own obsequies—to commit collective suicide—and glory in the event. He rather objected to assist at his own obsequies before the proper time; and he did not believe the time was yet. He thought, further, that the present body of the Gas Institute was admirably suited in its constitution for the requirements of a peripatetic society such as this was. They had various classes of members; and the rules were necessarily elastic, in order that the circumstances of those respective classes and individual members might be provided for. It cost them considerable labour, and some little expense, anxiety, and trouble, to provide the Code of Regulations which was adopted some ten years ago; and it had worked admirably since. This code was drawn up with the assistance of one of the ablest men of the legal profession connected with Institutions of this nature—the Solicitor to the Institution of Civil Engineers—and that being so, he was loth to acknowledge any necessity for departing from the rules which had served them so well. Why they should be asked to commit suicide, he could not understand. He complimented the President on the clear manner in which he had pointed out the advantages of amalgamation; but he had failed to convince him that anything whatever was to be gained by liquidation. In the first place, it was a sign of weakness. But were they weak? Had the interest of the members in the transactions of the Society during the last ten years been relaxed or diminished? Quite the reverse. They possessed more vitality to-day than ever in the history of the Institute; and this vitality he feared would not be encouraged by a continual change of name, or by going into liquidation. He knew it was to be a voluntary and silent operation; and there was a consolation in knowing that they were solvent. Notwithstanding this, however, it was a liquidation; and he believed a great deal of good resulted to a Society like that in continuity of policy, and in the perpetuation of a name. He trusted that the amendment he was about to propose would be accepted, and would remove the necessity for liquidation. They were asked to adopt the title "The Society of Gas Engineers and Managers;" but what about the secretaries? They had a Society of their own; but they had secretaries in the Institute, and they had never caused any trouble that he knew of. Again, anyone who was a managing director of a public company, if its business was trade (and most companies' business was), would have to be expelled; but he thought they ought to save those gentlemen from such a disgrace, and not ask them to resign a position which they adorned. They did not exclude chairmen of gas committees—men elected by the *vox populi*, who held their office for a very short time. It appeared to him that the amalgamation could be brought about without dissolution. He trusted it would be, and that they would welcome their erring brethren into the fold again. They would be very proud indeed to welcome their friends; and it was a fact showing the kindness of heart which animated the gas profession that, notwithstanding this unfortunate difference of opinion about trade, they were all friends in both Institutes, and some of the members belonged to both. He hoped this feeling would be long perpetuated. They were asked to show a united front, which was a very good thing on the field of battle; but they were not a combative Society. A united front would not delay for one moment the march of science, or arrest the development of invention. Where would they have been, as a profession, as a business, or as a trade, without the inventive ability of outsiders? What about Welsbach, and his new lamp? And what about a hundred other things which he could not stay to enumerate, which had brought about progress in all branches, if trade was to be excluded? The Institution of Civil Engineers would never have had an Armstrong, a Whitworth, or a hundred other able princes of trade, had it not been that they were allowed to follow their own vocation. It was quite true, unfortunately, that a few gentlemen who were associated with the Institute had been guilty of some slight acts of indiscretion; but it must not be forgotten that to err is human, to forgive divine. It should also be remembered that the extraordinary members of the old British Association of Gas Managers had paid a very high entrance fee to come into the Society; and he very much questioned if they could be expelled, or if the Society could be dissolved without their consent. They had had an unfortunate illustration of the difficulties of expulsion some ten years ago; and it was not for the majority, in all cases, to assume that they were right, and could do what they liked in opposition to the rights of individuals and the law of the country. He thought the extraordinary members should be called upon to state their views; and if they went to the Court for an injunction, he believed they would have a very good case. He was in the presence of a gentleman connected with the legal profession; and he would put that point to him—whether it was possible to exclude from the Society compulsorily, without consideration or compensation, people who had paid a heavy entrance fee, had subscribed to it for years, and had behaved themselves as English gentlemen should do. The amendment he begged to move was this—"That the liquidation of the Incorporated Gas Institute is not called for in effecting amalgamation with the Incorporated Institution of Gas Engineers; and that it be an instruction to the Council to effect the proposed union without dissolving the Institute." If it were the will of the Institute that they should commit suicide, he had no more to say, except he was sorry for it; and as one of the assentors to the Articles of Association, he desired to say to those who would have the direction of affairs in future, in the words of the dying gladiators of Rome, "*Ave Cæsar! Morituri te salutant.*"

Mr. H. Lees (Hexham) seconded the amendment. He said many would remember the very grave circumstances which occurred some years ago, when the late Mr. George Garnet was President, and when they had to contend with a similar arrangement very ably put forward by the Council at that time. He was rather surprised to hear Mr. Valon use the word "cannot." He did not believe in that word himself; and he would leave it out altogether. Those gentlemen who were on the books as extraordinary members numbered 48 in 1890; and they had now been reduced by the arrangement then made that no other extraordinary members were to be admitted. They were allowed to die off in their own quiet way. He thought it would be very well to take a leaf out of the former experience, when acting under the advice of Mr. Radcliffe, and say that members who shall be elected subsequently to the re-incorporation of the Institute should be so-and-so, but to still allow members who were on the books at present, one and all, to be carried forward as members of the new Society.

Mr. W. Carr (Stalybridge) supported the amendment. He quite agreed with the first resolution that it was desirable that, if possible, there should be only one body representing the gas industry; but the parent Institute—possessing the members and the funds—ought to consider very thoroughly the price they were asked to pay in order to get united with the people who certainly represented the *élite* of the gas engineering profession. In the report sent out by the Secretary, the number of ordinary members of the Institute was put down at 518. If they were to absorb the Institution of Gas Engineers, he ventured to say it would not raise the number really to 600, and they would lose 109. They were thus going to ask 109 people to retire in order to get what was not more than an ordinary year's addition to their membership roll. This was a big price to be asked to pay; and, considering the nature and character of some of the gentlemen who were requested to retire, which had been so eloquently spoken to by the seconder of the resolution, he was hoping, all the time Mr. Valon was speaking, that he was going to renounce the duty he had undertaken. If anything could have convinced him (Mr. Carr) that it was impolitic to pass the resolution, it would have been the speech of Mr. Valon. Why should they stop at Mr. West and Mr. Hepworth? There were other gentlemen, who had been perhaps less fortunately situated than they, but who had been quite as earnest in smaller matters in their helpfulness and single-heartedness, who were on the same roll, and had been

asked by the President, in a most injudicious circular, as he thought, to resign—a circular which intimated that if they did not gracefully retire they would be kicked out. He could here tell the President of a circumstance which perhaps he did not know—that out of the 57 assents he got, there were a great many more or less under compulsion, because they assented after the fashion of Mr. West and Mr. Hepworth; they were willing to retire if it was necessary. He thought it would be to the everlasting disgrace of the Institute if it were made necessary. He saw no reason whatever, and there had been no argument advanced by the President or by anybody else, why they should dissolve the Institute or expel these people, except that it had been made an explicit stipulation by the Institution. This was the one point upon which they made an absolute stand. They would not go on if the Institute would not do that. If this was the one point on which they made a stand, he was prepared to go on as they were; and he trusted the meeting would endorse the action he was taking by supporting the amendment. He was quite prepared, if the majority of the Institute decided to annihilate all these people for the sake of the gas industry, to support any resolution which was come to; but, in the meantime, he should do his best to prevent it being passed. He should like to go back to the time when they were what was called a united Institute. He did not think such a thing as being a united body ever occurred when they were all together before. They were divided into sets, cliques, and parties; and the wire-pullers in those days nominated their own successors. Very often there was a great under-current of feeling among the members which was not pleasant, and he was not at all certain that the same thing would not come about again if they effected what they were pleased to refer to as a united front. At the meeting last year, though he took part in what had been described as the "noteworthy incident," when Mr. Livesey, Mr. Bray, and Mr. Sellers made their appearance—and no doubt the feeling was unanimous among them all that it was a pleasant thing to see the lion and the lamb lying down together—and though the little bit of sentiment given expression to at the time was perfectly unanimous, he could not agree that the President and Council should have regarded it as a mandate that they were at once to take proceedings to bring about a union, and to put all other things aside until this was done. He did not think this was at all implied by that little bit of hand-clapping. With regard to the question of clause 4, under which all these gentlemen were to be excluded, he did not agree that it was an undesirable thing to have people connected with them who were interested in trade, nor did he see where they were going to draw a hard-and-fast line. There were members of the Institution who could not come into the new body under that clause; and they were pretty numerous. And if they were to go into the question of trade, what was trade? Was a man who was a shareholder in a concern interested in trade, or had he only to be the actual seller or director? He (Mr. Carr) thought the President himself was more or less a trader. He did not see any difference between a lawyer and a grocer in that respect; he had to pay them both. He was not against traders, but was rather of opinion that when they got men eminent in mechanics and engineering to become members, and join in their discussions, they were adding to their strength and to the interest of the proceedings. He was as much opposed to the little traveller who dodged about the lobbies outside, trying to button-hole the members and secure an order, as any member could be; and he should encourage the Council to do their utmost to exclude these people, and keep them out of the meetings altogether. He thought the action of the Council during the past ten years clearly showed that they had been careful on this point, and that a great improvement had come over the proceedings in that time. Seeing that they were at present working so well together, he did not think it advisable to change. A good deal was said about the name. Some people argued that the Institution had a better name than their own. In 1881, when they considered an alteration of title, the Council proposed that it should be called the Institution of Gas Engineers. The meeting at that time over-ruled the Council, and voted that it should be an Institute, which they said was an infinitely better title than Institution. It only showed how fashions changed. For himself, though at first he preferred "Institution," he had got to like the word "Institute;" and for a short title he thought "The Gas Institute" could not be beaten. There was another point in the rules to which he should like to call attention, which perhaps had not been noticed, for they were very voluminous. In his early days, when he was on the Council in 1879 and 1880, he had a great struggle to make it possible for individual members to have an opportunity of nominating a member of that body. Previously to that, the Council nominated their own successors, though they were always obliged to nominate twelve, whereas only four could be elected. Nobody else, however, could make a nomination. This was reformed, and it was so arranged that any two members could nominate a third; and it was the duty of the Council only to nominate when the members outside failed to do so. But he saw by the draft rules that they were going back again partly to the old system. Instead of two members being able to nominate, it required three; and they must have the candidate's consent in writing, which must be sent to the Secretary two months before the annual meeting. No one individual could put his name to more than one nomination. All this was hedging about, and depriving the members of their privileges, and increasing the difficulties of members in nominating, in order that the Council, once getting the power into their own hands, could practically appoint their successors, and have the management within the circle they thought most fitting. This was a backward movement which he felt he could not endorse; and he trusted that the rules would not be passed. He therefore supported the amendment.

Mr. CHESTER said he desired to put another amendment before the meeting, but he did not know whether he could do so until the first was disposed of.

The PRESIDENT said one amendment only could be dealt with at a time.

The SOLICITOR (who was present at the President's right hand) said he would answer the question which had been raised by Mr. Jones, who seemed not unnaturally to look forward with some dismay to his early dissolution. It was necessary, in order to carry out this amalgamation at all, that not only the Gas Institute, but also the Institution of Gas Engineers, should go into voluntary liquidation and be wound up. The articles of the Institute, which were drafted by Mr. Radcliffe, were so framed that the Institute might be amalgamated with any other institution or institute having similar objects; but the articles of the Institution were so worded that that body could not part with their assets to an existing body such as the Gas Institute. All that they could do would be to open their mouths and swallow up the Institute.

Mr. JONES said he, too, had taken legal opinion upon this question.

The PRESIDENT said they could not have a contest on a legal matter. It was much better to take the *ipse dixit* of their Solicitor. They certainly could not enter into a legal argument.

The SOLICITOR said under the Articles of the Institution they had, as a matter of fact and law, no power whatever to amalgamate, except by going into liquidation.

Mr. JONES: Then let them liquidate.

The SOLICITOR said both Societies must liquidate in order to carry out the amalgamation, as he wrote and informed the President two months ago. This was the reason why the amalgamation was being carried out by means of the liquidation of both Societies, and the regeneration of the two Societies in the form of one Society.

Mr. D. IRVING (Bristol) suggested that it would be of assistance to the meeting if they knew what the amendment was which Mr. Chester proposed to move.

The PRESIDENT said that would be out of order. If any amendment were passed to the resolution, the whole matter would be at an end; and, in his opinion, it would be at an end for the next generation, if not for longer.

Mr. W. W. HUTCHINSON (Barnsley) said he was present at the last annual meeting, when he heard it said by several honourable gentlemen that they were "burying the hatchet." Then he came to the present meeting, and, instead of burying the hatchet, it appeared to him they had practically got hold of it to knock down at least 89 men. This was what he could not quite understand. He very much wished the two Institutions to be amalgamated; and he desired to favour this all he could. He earnestly hoped that Mr. Livesey in particular would rise to the occasion, and, in his happy way, as he had heard him do before (for instance, on one occasion when he read

a paper on "Gasholder Tanks"), facilitate this matter, and go on the lines of letting the Institutions be fused—retaining the present associates only on the distinct understanding that no others should be added, but letting the existing ones gradually die out. During the discussion, he could not help feeling that the associates had no voice; and even if they had, they would have a natural reluctance to speak. But he thought it an unfair position to put them in, to ask them to resign after paying their money and conforming to the rules for so many years.

Mr. W. HARDIE (North Shields) supported the resolution. He said they must all be grateful to Mr. Valon for giving them so able a view of the situation. Mr. Valon and Mr. Hepworth had taken a very great part in making the Institute what it was; and when they had the views of these two gentlemen pressing them to accept the union as a desirable thing, they should be very careful before adopting an amendment which would tend to throw aside everything the Council of the Institute and the other body had been trying to bring to a successful issue during the past twelve months. It was agreed on all hands that it was desirable that union should take place. It was all very well to pooh-pooh the other Institution, and to say how much stronger the Institute was; but it was highly desirable that they should show a united front. He could testify, being a member of both Institutions, how very undesirable it was that there should be two. He knew many gentlemen at the present time—young engineers rising in their profession—to whom the question arose which of the two Institutions they should join; and with many gas companies and committees it was a difficulty, when their managers and engineers asked to be away to attend these meetings, and they wanted to know whether they were going to a meeting of a body who really represented the national industry or not. When they had two Societies, neither of them could be said to be entirely representative of the gas industry of England, Scotland, and Ireland, because it left outside some of the best names in the profession. He hoped the members that day would endeavour to throw out some of these smaller matters for the purpose of accomplishing this much-desired object. With Mr. Valon he certainly did regret that some means could not be found to retain in the Institute, somehow or other, the services of gentlemen such as Mr. Hepworth, Mr. West, and others who might be mentioned; but at the same time he thought, if necessary for the good of the gas industry, they should sink one or two little personal matters, so that the thing might go on. The Articles might be left in such a way that the rules of the new Society could be amended if they were not found suitable.

Mr. J. CARTER (Lincoln) thought that the issue might be much cleared if the President could see his way to allow Mr. Chester to mention the terms of his amendment.

The PRESIDENT said he was advised that he ought not to have a further amendment read until the first had been disposed of.

Mr. VALON asked if it was the opinion of the Solicitor that Mr. Jones's amendment was a direct negative to the proposition before the meeting.

The PRESIDENT said certainly it was a direct negative.

Mr. R. FISH (East Cowes) said he was strongly in favour of amalgamation, and was very sorry there had ever been a separation. Still, as it had occurred, if they could do anything to facilitate an arrangement for reunion, it was their duty to do it. He was greatly surprised that Mr. Jones had proposed an amendment which would be fatal to the amalgamation, and was very pleased that the Solicitor should have stated, in so clear a manner, the position of the two Societies. He understood him to say it was impossible, under the present condition of the Institute rules, to amalgamate with any other institution or society.

The SOLICITOR said the Institution of Gas Engineers could not amalgamate with the Gas Institute except it opened its mouth and swallowed them up, unless they also went into liquidation.

Mr. FISH said the result was that, if they desired to have amalgamation, they must voluntarily liquidate; and he hoped, therefore, that the members would reject the amendment. They had already passed a resolution approving amalgamation; and he trusted they would now show their practical wisdom by voting against the amendment.

Mr. J. P. LEATHER (Burnley) said they had already passed a resolution that they were in favour of amalgamation, if it were managed in a proper way; but it appeared to him that the only real question arose with regard to clause 4, which was the principal thing Mr. Jones had spoken upon, particularly one word in it—the word "remain" as it affected the question of present membership. This was the point on which they were all thinking. They were willing to agree to the rule if it were not retrospective; and he felt that they had had no arguments as to why it should be. They could not call it an argument to say the other side had made it a condition. The question was why they had made it a condition; and if this could be made clear—and no doubt it must have come forward in the discussions of the Joint Committee—it would be a great help to members in voting. With regard to the amendment, he felt very strongly with Mr. Jones against liquidation, and thought it would be far better to keep the present name. There was a great deal in a name; and none they could agree upon would be so good as that of "The Gas Institute." He was therefore very sorry that re-union could not be managed in some way without liquidation and change of name. He would not enter into the legal question, but he rather gathered that it was on the part of the Institution that the difficulty lay; and the only reason why they were called upon to liquidate was in order that both should be on the same footing. As far as the law was concerned, however, it would be sufficient if the Institution liquidated.

Mr. J. STELFOX (Belfast) said he had always regretted the split, and never could see any reason why it should have occurred; and from that time to the present he had always hoped to see some method suggested for bringing about re-union. It was on the trading question that the split took place, though the trading element was introduced very largely by some who now expressed their intention to vote for the resolution. So that it was evident their views had changed since that time. But whatever they thought in the past, they were all agreed now that, on the whole, it would be better to let the trading element have its own place, and that not in the meetings of the Institute. Therefore, if they could not get all they wanted, they must take all they could get; and though probably there might be no occasion to dissolve, if they were going to form a new Institution they ought both to start on the same footing. Their Solicitor told them that this was the best and the safest way; and he thought they should accept that opinion, and go straight forward. They were not liquidating because they were insolvent, for they could pay 20s. in the pound; so that they could not be disgraced in any way. Nor were they liquidating from weakness, or anything of that sort. There were one or two matters in the draft rules to which he took some exception; but one had been rectified. He understood that, in future, members were to pay two guineas subscription; but this did not apply to present members.

The PRESIDENT remarked that this should have been in the rules.

Mr. STELFOX said he understood, in other words, that the members of the Institute would join the amalgamated Society on exactly the same footing as that they now held.

The PRESIDENT: Exactly the same.

Mr. STELFOX said he thought it would be a great injustice to tell members who had been connected with them for many years that they could only come forward in the new Society as associates.

The PRESIDENT said they would go in exactly in the same position, and as of right.

Mr. STELFOX said, with regard to the name, he was sorry it was going to be changed, and it was a matter of more importance than might at first sight appear. It was like giving a child a long ugly name which it had to bear all through life; and he must say he did not like it. If it were absolutely necessary to change the name (and he understood the Institution would not object to carrying on the old name), why could it not be called the United, or the Amalgamated, Gas Institute? "The Society of Gas Engineers and Managers" was long and troublesome; but he understood that passing the resolution would not prevent the Council thinking that matter over.

The PRESIDENT: Certainly not.

Alderman MILES (Bolton) asked if he understood the President to say that, if the amendment were carried, the amalgamation would be absolutely at an end.

The PRESIDENT said that was so.

Alderman MILES expressed his regret at hearing it. He always thought it was possible, if one amendment were

carried, to move another, which might bridge over any difficulty.

The PRESIDENT said the point was this: It was not an amendment which the Council could carry into effect. It was one which another party had to agree to; and the other party said they would not agree to a certain course of action to which this amendment would bind them.

Alderman MILES said, after this authoritative statement, the members would know their position, and would vote accordingly; and this he should feel bound to do. Nobody desired more ardently than he did the amalgamation of these two bodies. But it should be done upon equitable and just terms; and he did say, with the greatest possible respect to the Institution of Gas Engineers, that, in his humble judgment, these terms were not just or equitable. After the President's statement, it was of no use saying any more, though he greatly hoped that another amendment might have been moved later on, which would have bridged over the present difficulty.

Mr. D. T. LIVESEY (East Grinstead) said that this was a matter for conciliation. The body with whom they were anxious to unite had already passed a resolution saying that it was very desirable that the Institute and the Institution should become one organization. The Institution, he understood, could not possibly unite with the Institute without annulling itself; and, therefore, in order that they might start on the same basis, they should also annul themselves—or "commit suicide," as Mr. Jones had called it—in order to start together as one body. It did seem to him that this was the only possible ground on which they could start on fair lines, or, as Alderman Miles had said, in a position of equality. If the Institution must, on account of its rules, annul itself in order to become amalgamated, it did not seem to him it should be very difficult for them to do likewise, and to join on the same lines. He did not think it should be beyond the power of a body of gentlemen like the Council to bring the matter to an issue in a way which would be creditable to themselves as well as to the other Association. If they wished to bring about amalgamation, which they all said was desirable, surely they should discuss the subject in a conciliatory spirit. There seemed to be a tendency in some quarters to suggest that the Institution had thrown down the gauntlet—that it would only do certain things on certain conditions, and that they must necessarily accept them. He thought the members were entitled to say now what was their view of this matter, and leave it to the Council to carry out their wishes as far as possible. As to the amendment, it was a direct negative to the resolution suggested by the Council. They proposed that the Institute should be dissolved; and the amendment suggested that they should not do so. Was it not desirable, if the amalgamation was to take place, that it should be done in an honourable manner, and with credit to themselves? Was their anything in the way of doing it which was insurmountable? If they were now to accept the resolution, surely there was sufficient ability in the Council to carry out the wishes of the members; and these little difficulties, which all admitted, might perhaps be got over. They all regretted losing the gentlemen whose names had been mentioned, and a number of others; but it occurred to him that they might have another paragraph added to the rules, providing for the election of extraordinary members because of their association with the profession. He hoped they would carry the resolution, and go on with the amalgamation.

Mr. CARTER said he was quite sure the meeting was not in anything like a fit condition to give a distinctive and positive vote upon such an important matter as the passing of Mr. Jones's amendment would involve. No doubt there was a large consensus of opinion that, in the formulation of the Articles of Association, there had been such a ruthless violation of existing rights as one would scarcely find in any scheme of amalgamation of any character whatever. The hundred associate members surely had some rights which were entitled to respect; and among the Council there should be enough moderation and ordinary English common sense to evolve some scheme by which everything which was desired with regard to these members might be largely met, and that the anxious and earnest labours of the two Councils should not be rendered altogether futile. There was something in the amendment not at all consistent with the first resolution, if the view that it was desirable to amalgamate was anything more than an abstract idea or pious opinion. It seemed to him that, by adopting the amendment, they were simply wrecking the scheme on the merest matter of form. The first thing to settle was, Was amalgamation desirable? If they agreed to this, he took it that, as men of sense, they ought not to allow their opinion to be shattered, or a mere matter of form to stand in the way of its being carried out. He was anxious to preserve the rights of those gentlemen who were sometimes rather disdainfully referred to as "traders," but who had rendered distinguished service to the gas industry. He was, however, also anxious that the labour of the Council should not be thrown away, and that all the hopes which had been centred on the progress of these negotiations should not be shattered by one rude blow at this juncture. The object was to maintain the position of the associate members in the amalgamated Society; but if the amendment were adopted, the die would be cast—the whole thing would be decisively settled, and there would not be the smallest door open for further negotiation, or any future possible agreement between the two Associations.

Mr. JONES: Then it is a shame if there is not a door open.

Mr. CARTER said that, to his mind, the only way to keep the gate open was by defeating the amendment, and then possibly some other amendment might be put forward which would make the position more plain with regard to the associate members.

Mr. W. PRINCE (Stoke-upon-Trent) said he should like to know whether, if the amendment were negatived, the members were pledged to amalgamate on exactly the lines laid down in the draft rules which had been circulated. It appeared to him that the President and the members of the Council were in a very responsible position—in fact, upon the President's generalship the amalgamation of the two bodies now depended; and he (Mr. Prince) hoped that the amount of power he possessed would be brought to bear on the question, and that there would be some way found to solve the difficulty which had been referred to. He felt sure it must have been patent to the President that there was a strong current of feeling antagonistic to the amalgamation under the clauses as set forth; and he (Mr. Prince) wanted to make an appeal, on behalf of the younger men, that every consideration should be given to it. He felt that there was a great principle at stake; and he thought it would redound to the honour of the President and the Council, if this amalgamation should take place, if it could be done in a way satisfactory to everyone, and without loss of dignity to either side.

The PRESIDENT, before putting the amendment, said as far as he was personally concerned, he did not mind whether the amalgamation would redound to his honour or not. They had been asked whether or not any alteration could be made in clause 4. He did not know that it could. It was possible that there might be some alteration; but he did not know. This, however, was not the final vote which the members would be able to give on the matter. A month hence they would be called together again to record their final vote; and if they were not satisfied then, all they would have to do would be to simply say "No," and they would revert to their old position—in fact, no steps could be taken with regard to winding up till the confirmatory resolution had been passed between a fortnight and a month hence. But in respect to the amendment, it was a direct negative to the resolution, because it said "the liquidation of the Incorporated Gas Institute is not called for." It was absolutely called for, if they were to amalgamate, for two reasons. There were several men—some of them mere traders, absolute traders—who either did not intend to resign, or, as in the case of one man who was a mere trader, absolutely objected to do so. How could they ask others to go if they retained these? Therefore, if it were only to get rid of that one man, it would be necessary to dissolve. They must also do so in order to start on the same footing as their brethren in the Institution. They knew they were by far the larger number; but to say by this resolution or by the dissolution that they would turn out 100 and take in 50 or 60 was altogether wrong. They would take in more than they would turn out; and if, instead of counting them, they weighed them by the position they occupied in the profession, they would take in infinitely more than they would be turning out.

Mr. W. CARR: How many?

The PRESIDENT: Probably 150.

Mr. CARR: Half of them are members of the Institute already.

The PRESIDENT said there were nearly 240 members in the Institution, and not 40 per cent. were members of the Institute—only 50. Therefore they would take in nearly 200. Then they should look at the difference of the men, with the exception of one or two, who had expressed their willingness to resign, when comparing them with men like Mr. Livesey—(murmurs)—he would not mention names; but many of those others were not comparable with him as a leading man in the profession. It was for the meeting to decide whether or not the amalgamation should take place. He trusted it would; but it could only do so on certain terms, and these were more or less shadowed out in the resolution. He would remind the meeting that the resolution said that the rules were subject to alteration by the Council; and if the alteration did not suit the members, a month hence they could negative the whole thing. He concluded by reading the amendment through and putting it to the meeting.

Mr. JONES said that under Rule 53 he claimed a vote by ballot.

The PRESIDENT asked the members entitled to vote, who were in favour of the amendment, to hold up their hands. This having been done, he stated that the members voting in favour of it were 31. On putting the contrary, he declared the amendment lost.

Mr. JONES: I take it, Sir, that you refuse a poll?

The PRESIDENT said he did, as it required a demand by six members.

Mr. CHESTER said he was quite sure there was but one feeling among the members, and that was that the labours of the Council should not come to nought for any frivolous reason. It was the desire of all that amalgamation should take place, and the only question was as to the price they were to be asked to pay for it. He did not believe the members would be willing to pay the price asked in clause 4 of the Articles of Association.

The PRESIDENT asked Mr. Chester whether, if a proviso were put in allowing eminent gentlemen to be elected at the will of the Council, this would meet his view.

Mr. CHESTER said he thought the members would want some clearer definition than this. He feared there was no possibility of getting over the difficulty in that manner; but, in order to keep the door open for amalgamation, he begged to move a further amendment. He should adopt the resolution down to the words "Memorandum and Articles of Association," and then delete the remainder of the paragraph, and add: "But that the draft Memorandum and Articles of Association now presented do not meet with the approval of the members, and that they be referred back for the further consideration of the Council." This left the gate entirely open. The Council would have gathered, from the expressions of the members, that there was a very strong consensus of opinion that those whom the Association proposed to eject from membership should not be sacrificed in the manner suggested in clause 4. They were all desirous of amalgamation; but to expel men like Mr. West and Mr. Hepworth, and also Mr. Sugg, than whom there was no more honoured member of the Institute, who had spent a whole life in promoting the welfare of the gas industry, and who was at all times ready to lay his experience and knowledge before the members, to say nothing of younger engineers like Mr. Pease, who was the inventor, to a certain extent, of an epoch-making device—to deprive themselves of any individual who came out with new schemes and new inventions in connection with the manufacture of coal gas, would be to narrow the lines of the Institute in a manner which was very undesirable. They wanted to broaden the basis rather than to exclude such members; and he should be glad to see the gates opened wider to receive men of all kinds of eminence who were associated with the welfare of the gas industry. They did not want to emasculate the industry by depriving it of manhood, as was proposed by clause 4, but to keep the basis as wide as possible, and to increase rather than decrease its usefulness. For this purpose he moved the amendment.

Mr. ISAAC CARR (Widnes) seconded the amendment, which he said would provide a way for dealing fairly with those gentlemen whom it was proposed to expel, and for doing not only what was just to those gentlemen themselves, but also greatly to the advantage of the Institute.

The PRESIDENT said he did not think it was necessary to discuss the amendment at much length, after what had taken place; but he would ask the members to consider the matter carefully before adopting it. If it were passed, it would hang up the matter indefinitely; and they all wished to have it decided. Those who were in favour of any such alterations in the rules or the Memorandum of Association as had been suggested, had only to formulate them for the two Councils to consider, and, if possible, they would be adopted. He did not say that any alterations would be made; but they would be if possible. They would then register the new Society; and when they were called together again to pass the confirmatory resolution, if they were not satisfied, they would simply have to say "No." Then the matter would be decided. The passing of the amendment before them simply meant hanging the question up for another twelve months at least; and this would give opportunity for a great deal of dissension and trouble. All these matters were open for the revision of the Council; and therefore, if members would send in their views, the Council would consider them when meeting the members of the Institution, and try in all ways to adopt them.

The amendment was then put; and the voting was 60 for and 70 against it. It was therefore lost.

Alderman MILES said he had another amendment to propose. He would accept practically the whole of the resolution down to the words "subject to such alteration," and then he would insert, in clause 4, which was the clause affecting the whole of this position, "no person shall be qualified to become a member of the Institution, after the date of the amalgamation, who shall be actively engaged in or about the management and business," and so forth—deleting the words "be or remain," and putting in the words "become a member after the date of amalgamation." The effect of this would be, to his mind, to let the members as they at present existed, remain intact; and in the election of any future members to allow the principle of clause 4 to come into operation. He knew this would meet the views of a great many members; and it was the *crux* of the whole question.

Mr. CHESTER said he had great pleasure in seconding the amendment, as it exactly fitted in, he believed, with the feelings of the meeting; and if it were carried it would have the effect of doing what he desired to do perhaps in a more gentle way, by allowing the Council themselves an opportunity of carrying out what Mr. Miles suggested. He could not help feeling that it was a little curious that they had heard no expression of opinion from any member of the Council. He hoped they were all so absolutely unanimous that there was but one feeling to be expressed.

The PRESIDENT said that was the position.

Mr. JONES supported the amendment, as it would carry out exactly what Mr. Chester and he had been wishing, and would prevent the expulsion of some of their earliest and best members. A breach of faith, either on the part of an individual or a public body, was a most dishonourable thing.

Mr. VALON said the President had already stated that any suggestion coming from individual members would receive every possible attention, and would be represented to the other side. When it came, as it would do here, from the meeting—showing the very strong feeling that something should be done in the way of modifying clause 4—might they not leave it for the present in the hands of the Council, without passing the amendment? If they would leave it in this way, the Council would have the power, if they were not able to do all they wished, to do all they could; and he would appeal to members not to tie the hands of the Council except by an expression of opinion.

Mr. W. FORD (Stockton) said he should like, as a retiring member of the Council, to support the suggestion of Mr. Valon. He felt very strongly on the question of sending some of his oldest and most esteemed friends out of the pale of the Institute. Having been an original member of the British Association of Gas Managers, and being also a member of the Institute, he should not like to condemn these men entirely; but he should assure them that every member of the Council, whether opposed to their inclusion or not, would give the most earnest consideration to the matter.

Mr. H. LEES (Hexham) said he had given this matter a great deal of consideration. He could speak thereon with much feeling for those who went through the trouble of fourteen or fifteen years ago, and could sympathize with the position some members might take up that morning. He hoped, however, the feelings then generated would not

be allowed to influence the voting. To postpone this question for another twelve months would be a serious blow to it; and he feared that, if it were postponed, there would be no amalgamation. He considered that all who voted on the first resolution had committed themselves to amalgamation; and the passing of the amendment would be fatal to it. He was sorry for those who would have to retire; but if they consented to it—if 99½ per cent. were willing—why should they make further trouble about it? Consideration had been given to them. They had been asked if they were willing to retire, and those who took any interest at all in the Institute said they were. He knew that some of them were giving up a great deal; but they did not mind making the sacrifice at this juncture in order to bring about an amalgamation which should help forward the gas industry in future generations. There were certain points in the draft rules upon which he might have made some remarks; but perhaps this was not the proper time to do so. He trusted the resolution would be passed without the amendment. Could they not trust the Council, who, he believed, had carried out the wishes expressed at the last annual meeting? He was not present then, and was not committed to amalgamation; but he trusted that they would support the Council, and not wreck the scheme for the sake of sentiment.

The PRESIDENT then put the amendment, with the following result: For, 62; against, 81.

The original resolution was then put and carried by 82 votes to 18.

The PRESIDENT said there was one other resolution which did not require any further debate—viz.: "That the Institute be wound up voluntarily." There could be no amendment to this resolution; it must be simply "Yes" or "No."

Mr. CHESTER asked what was the requisite majority for the passing of the resolution.

The PRESIDENT said a majority of three-fourths.

The resolution was then put, and the votes were: For, 95; against, 37.

The PRESIDENT announced that the resolution was lost by four votes.

A MEMBER asked if it would be in order to demand a poll.

The PRESIDENT said yes, if six members demanded it.

After some discussion, it was decided that a poll should be taken at four o'clock that afternoon.

It being then two o'clock, the meeting adjourned for luncheon.

On re-assembling in the afternoon, the reading and discussion of papers commenced; the first taken being that by Mr. Chester, on "Automatic Stoking and Inclined Retorts." The discussion of the paper was in progress at four o'clock, when the poll was taken; Mr. T. H. Martin (Barnet) and Mr. C. E. Jones being appointed tellers. At half-past four,

The PRESIDENT said a great many people who did not vote in the morning appeared to have done so now; the votes being 86 in favour and 64 against the resolution. It appeared that those who had not sufficient confidence in themselves earlier in the day had voted differently now. The matter was entirely lost; and he would just say that, as far as amalgamation was concerned, it might be relegated for many years.

The meeting was then adjourned till the following morning.

THE BENEVOLENT FUND.

The Annual Meeting of the Donors and Subscribers to the Benevolent Fund was held at the conclusion of the sitting on Tuesday—Mr. W. R. CHESTER in the chair.

The minutes of the previous meeting were read and confirmed, and the report and accounts, as circulated, were adopted. No discussion ensued; and the proceedings terminated with an invitation from the Chairman to any members to send to the Committee, for their consideration, particulars of deserving cases with which they were acquainted.

THE PAPERS AND LECTURE.

On the resumption of the proceedings on Wednesday, the discussion on Mr. Chester's paper, interrupted on the previous afternoon, was finished; and the lecture and the other papers followed. The order was—

Tuesday.—(1) "Automatic Stoking and Inclined Retorts." By W. R. CHESTER, of Nottingham.

Wednesday.—(2) "The New Gas." A Lecture by W. H. Y. WEBBER. (3) "Roofs for Retort-Houses." By A. T. WALMISLEY, of London. (4) "Some Disputed Points among Gas and Water Experts." By J. WILKINSON, of Drighlington. (5) "Naphthalene, from the Retort to the Point of Deposition." By W. YOUNG, of Peebles.

To-day we give (p. 1627) the lecture; and the papers, with the report of the discussions thereon, will appear in the next issue of the "JOURNAL."

REPORT OF THE SCRUTINEERS.

At the close of the technical business, the report of the Scrutineers was presented. It showed that the following gentlemen had been elected office-bearers of the Institute for the ensuing year:—

President.—T. O. Paterson, of Birkenhead.

Vice-Presidents.—S. W. Durkin, of Southampton; and A. Dougall, of Tunbridge Wells.

New Members of Council.—T. Bower, of West Hartlepool; W. Carr, of Stalybridge; W. S. Haddock, of Warrington; and T. P. Travers, of Cork.

Auditors.—W. D. Child, of Romford, and Samuel Wood.

Honorary Secretary.—J. Davis, of Gravesend.

MEMBERS.

Birch, H., Wellington (N.Z.).
Braithwaite, J., Wrexham.
Brown, J. H., Ilford.
Buckley, J. H., Formby.
Cobban, A. M., Scunthorpe.
Currie, W., Alexandria (N.B.).
Dixon, J., North Walsham.
Falkner, F. J., Romsey.
Garlick, D. E., Barnoldswick.
Goodson, A. F., Heckmondwike.
Hole, W., Leeds.
Jenkins, C., Portsea.
Newbigging, E. L., Macclesfield.
Schofield, F. L., Barnstaple.
Shadbolt, T. E., Grays.
Spier, W., Rockhampton (Queensland).
Stevenson, G. E., Long Eaton.
Theobald, J., Henley-on-Thames.
Turner, J. W., Torrington.

ASSOCIATE MEMBERS.

Bury, A. N., Wrexham.
Gandon, H., Lower Sydenham.
Hunter, R. W., Chester.
Lewis, G. P., Lower Sydenham.
Williams, H. R. S, Lancaster.

TRANSFERENCES.

The following were reported to have been transferred from the class of associate members to that of members:—

Airth, G., Dundalk.
Buckland, W., Chesterfield.
Duxbury, Thos. H., Bradford.
Hutchinson, Harold, Barnsley.

The report of the Scrutineers was adopted.

HONORARY MEMBERS.

On the recommendation of the Council, the President of the Société Technique du Gaz en France was elected an honorary member of the Institute, as was also Mr. Alfred Lass, late an Auditor of the Institute.

THE AMALGAMATION QUESTION AGAIN.

Mr. J. STELFOX (Belfast) said that, as the result of conversation with a number of members, and finding that the general feeling of the Institute, as was apparent on the previous day, was that the proposed union, which seemed for the moment to have been frustrated, should be carried out, he had been asked to propose a resolution. In doing so, he did not intend to occupy more than a few moments, as, of course, the subject was well known, and had been well ventilated. They had on Tuesday discussed the subject for more than three hours, and were unanimously of opinion that amalgamation should take place. But, subsequently, in a few moments, they did away with all the good they seemed to have done, and finally left matters in a very unsatisfactory state. The Council—not only last year's, but that of the previous year—had worked in the direction of securing this union between the two Societies; and they had seemed almost to have got to that point where the success due to their efforts was assured. It was quite clear that it was the opinion of the members universally that amalgamation was desirable—(hear, hear)—and he thought it would be extremely unfortunate if they were to break up now, and leave the matter as it rested at the moment. He begged, therefore, to propose the following resolution: "That, as the desirability of

the union of the Incorporated Institution of Gas Engineers and the Incorporated Gas Institute was unanimously resolved by the members of the Institute, as shown by the voting yesterday, we desire to place on record our appreciation of the labours of the President and Council in endeavouring to bring about the amalgamation, and earnestly request them to continue their efforts to secure a satisfactory amalgamation, and to call another meeting of the Instituteto consider and vote on their proposals at the earliest possible opportunity." (Applause.)

Mr. VALON said that, after a conference with some of his friends, he had undertaken to second this motion. He intended to do so with all the earnestness it was possible to put into it; but, hearing the reception the resolution had met with, he felt certain that all he need do was to second it, and that it would be carried unanimously. As the matter at present stood, it certainly did not represent the feeling of the meeting; and if the resolution were to drop, the Institute would be in a false position. He therefore hoped that the resolution would be carried absolutely unanimously.

Mr. CHESTER, as the mover of one of the amendments which brought about the present condition of affairs, said he had very great pleasure in supporting the resolution. He believed the majority of the members of the Institute, and also of the Institution, wanted amalgamation, and did not wish for the exclusion of a great number of those gentlemen whom clause 4 of the Articles shut out. He believed they all desired that the two Institutions should amalgamate, and that those gentlemen should remain members. On these grounds, he could not help feeling that the conclusion arrived at by the final vote on the previous day left the Institute to some extent in a false position. He believed it was within the powers of the Council to draw up such a scheme as would enable them to bring their past efforts to a successful conclusion.

Mr. ELLERY said he was more than pleased that this resolution had been brought forward, because he believed that on the preceding day they went away with a consciousness that what had been done did not represent exactly the feelings of the members. The present resolution brought them somewhat nearer to what they needed. It was a great matter; and in great matters it was not easy always to make the position plain, even to themselves. But he thought they were doing so now; and the Council might go away with a feeling that they had a solid vote behind them, at least on the point that the gas industry should be represented by one front. Ever since he had had the honour of being President of the Institute, he had been convinced that all gas engineers—or, at any rate, with very few exceptions—desired to be together in one body; and he could not help feeling that there were enough business men on both Councils to see a way by which this desirable end could be attained. He was satisfied that, however diverse their opinions might be on matters of detail, on the general desirability of amalgamation there was only one opinion; and if the President and Council went away with a feeling that the Gas Institute desired to find a way, as he believed the Institution of Gas Engineers did, towards this desired end, a way would be found.

Mr. W. CARR said he was one who opposed the efforts of the Council on the previous day. He subscribed to the first resolution—or, rather, did not vote against it—and certainly desired the amalgamation to come about; and as he now heard he was a member of the Council, his efforts would be in this direction. If some slight amendment could have been accepted on Tuesday, possibly they might have come to a very different conclusion; but he did not think that any harm was done. It was not wise to do these things in a hurry. Probably if the President would help them in the days to come, they might arrive at a much wiser and better conclusion in the end than they would have done on the previous day. He trusted it might be so—at any rate, he would do all he could to bring about an amalgamation.

Mr. T. O. PATERSON said the members might rely upon it that he would do all he could to bring about an amalgamation of the two Societies. There appeared to be very little between them; and he should say that what difference there was could be overcome without much giving way on either side. It seemed to have been narrowed to a very small gap; and he had no doubt the matter might be brought to a successful issue.

Alderman MILES said, as the mover of a somewhat hostile amendment on the previous day, he was thoroughly in accord with the sentiments now expressed. As he had said, no one was more ardently desirous to see the two bodies amalgamated than he; it was only a question of just and equitable terms. Now that the Institute had expressed itself in the manner it had done that afternoon, and they had just heard that the new President and new member of Council were going to use their best efforts towards bringing the amalgamation about, he had the most perfect confidence in leaving it in their hands, believing they would do all they could to re-unite the Institutions. There was only one difficulty that occurred to him. It was suggested that a meeting should be called as soon as possible to ratify this. But the trouble would, he thought, be to get members from all parts of the kingdom to attend the meeting. He trusted they would all do their best to bring about an amicable settlement.

Mr. W. W. HUTCHINSON supported the resolution, which, he said, met with his cordial approbation. He expressed the belief that the two Councils would have no difficulty in arriving at a satisfactory conclusion. A feeling of disappointment was certainly present among the majority of the members on the previous night; but he hoped this would be changed to one of satisfaction.

Mr. S. W. DURKIN desired to express his satisfaction that the olive-branch had been thrown out. On Tuesday, he made up his mind to resign his position on the Council, as he took the vote then passed as one of want of confidence in the President and Council. (No, no.) He should be very pleased to work with the new President and Council for the object they all had at heart; and he trusted that in due time they would see the fruition of their hopes, and the two Institutions working together for the good of the industry in which they were all engaged.

Mr. J. CARTER remarked that it seemed superfluous to say that the resolution was one which they should support. He would put it rather more strongly, and say that the circumstances of the moment rendered such a resolution absolutely necessary. As the position was left on the previous afternoon, he was quite certain everyone must have felt that it misrepresented the actual sentiments of the members; and it would have been an absolute calamity if they had been allowed to separate without an opportunity of revising their position, and correcting, it might be, the series of mistakes they had made. He felt on the previous evening that probably the cardinal mistake was in rejecting the amendment which Mr. Chester moved. If the gate had been left open, as that amendment rendered possible, the position would have been vastly more favourable than that which was eventually reached. At any rate, the resolution now before them would correct the mistake; and he was quite certain that the real feeling of the Institute was in favour of the door for negotiation being re-opened, and a strong desire that a promising movement should not be wrecked by a moment's inconsiderateness.

Mr. CHESTER remarked that they would like to hear the views of the Junior Vice-President on the question.

Mr. A. DOUGALL (who had only just entered the room) said he was at some disadvantage in not having heard the resolution; but he understood the question was the desirability of re-union. This subject he had had before his mind for five years—in fact, all the time he had been Honorary Secretary; and, in his humble way, he had tried not only to maintain the position of the Institute, but to do everything in his power to bring about the amalgamation. He felt the difficulty of carrying on the two Societies; and it was quite true that the members of both had a very keen desire to unite and form one strong body. He could assure the meeting that he would do his best to effect this. He was very glad this matter had been brought forward, because he certainly did feel that the action of the previous day amounted to a vote of want of confidence in the Council, but he presumed the members had somewhat altered their minds in this respect.

The PRESIDENT said he would now put the resolution, on which he would not say a word, except that everyone knew that he had done his best to bring about union. He hoped the motion would be carried unanimously.

The resolution was then put to the meeting, and carried *nem. con.*

PLACE OF NEXT MEETING.

Mr. T. H. MARTIN (Barnet) moved that the Institute hold the meeting next year in Liverpool, which he thought would be a convenient place, seeing that the new President

came from the North, and there was plenty of hotel and other accommodation.

Mr. T. Bower (West Hartlepool) seconded the motion.

Mr. Valon suggested that, under the present circumstances, it would be better to meet again in London. He said this after consulting the new President (Mr. Paterson); and he would therefore move, as an amendment, that the meeting in 1901 be held in London.

Mr. J. M'Gilchrist (Dumbarton) seconded the amendment.

Mr. Chester supported Mr. Valon's suggestion, understanding that it would meet with the approval of the new President. He thought if they were to "commit suicide" next year, they had better do it in London.

Mr. Martin said, if this were the feeling of the meeting, he would withdraw his motion.

The President said it would be just as well to take the opinion of the members, whether they preferred to meet in the country or in London.

On a show of hands, the majority were in favour of London.

Votes of Thanks.

The President then proposed a vote of thanks to the Société Technique de l'Industrie du Gaz en France for their kind invitation in connection with the Institute's visit to the Paris Exhibition, and the arrangement so courteously made for the reception of the members; also to the Compagnie Parisienne du Gaz for their very acceptable invitation to the members to visit the Company's station at Clichy, and for the facilities they were kindly providing in connection therewith. It was very good of them to receive the Institute so cordially; and as he knew one of the gentlemen who were going to meet them on Saturday—M. Lebon—he was quite sure they would be received exceedingly well.

Mr. Ellery said he was looking forward with pleasure to this visit; and as he had been for some years in the habit of receiving copies of the French Society's proceedings, he had very great pleasure in seconding the vote of thanks.

The motion was carried unanimously.

Mr. J. P. Leather (Burnley) then proposed a vote of thanks to the authors of papers.

Mr. J. Braddock (Radcliffe) seconded the motion, and it was carried.

Mr. T. Hands (Enniskillen) proposed a vote of thanks to the Scrutineers.

Mr. J. Booth (Southport) seconded the proposition; and it was carried unanimously.

Alderman Miles said he had great pleasure in asking the members to accord a hearty vote of thanks to the Council for their services during the past year. It would, he thought, be admitted on all hands that the work of the past year had been unusually heavy and difficult; and though the thing on which they had set their hearts did not immediately come to pass, he thought they could compliment them on the fact that at last they were in a fair way to its accomplishment. He was sure the members heartily appreciated their services.

Mr. Irving, in seconding the motion, said he could assure the President and Council that the members deeply sympathized with the position in which the vote of the previous day had placed them. It was all very well to make speeches; but he much regretted that they were unable to endorse the arrangements the Council had made. However, they had been invited to take the matter up again; and he trusted they would forget all about the resolutions of Tuesday, and keep in mind the unanimous request now made to them, and endeavour to bring about some settlement. They might depend upon it that, whatever conclusions they arrived at, the members of the Institute would support them to the end. The members must clearly understand that, when they appointed a Council who entered into negotiations on their behalf, they were bound by all that was honourable to support them; and he wished to pledge himself, and many others who agreed with him, to this. The Council should have their support, not only in votes of thanks, but right to the end.

Mr. W. W. Hutchinson concurred with the motion.

The President said he was not now a member of the Council, and was not included in the resolution. He might therefore say to the members that if they were not grateful to the Council they ought to be, for they had done well.

The motion was carried by acclamation.

Mr. Martin being called upon to respond, thanked the members on behalf of the Council for their cordial vote of thanks, and said that he should certainly do his best to carry out the proposition contained in the resolution passed that afternoon.

Mr. C. E. Jones said they had thanked the Council for their labours, but they must not forget that the Council had a head who was not included in the resolution—viz., the President. Of course, the anxieties and responsibilities of the President of an Association like theirs were very trying and onerous, and frequently very thankless. That the President had had a trying time they would all admit. But he had not only had it in the conduct of the business in that room, but for the whole of the previous twelve months; and he (Mr. Jones) thought his services were deserving of their special recognition. It had been said on the previous day by Mr. Valon, that the President sat in the chair which had once been honoured by his father; and it was his (Mr. Jones's) privilege many years ago to stand up and move a vote of thanks to that gentleman. He thought, therefore, it was only appropriate that he should be allowed the privilege of doing it on the present occasion. In the freedom of debate and the warmth of discussion, expressions were made use of which would possibly be somewhat toned down if they had more time for consideration; and he hoped the President would forget the hard knock which had been given him in any discussion which had taken place, and that speakers and movers of resolutions, wise or unwise, would also adopt the suggestion, and forget all these things, and go on again with a fervent desire to carry out the best interests of the Institute. He did not remember, in his experience of something like 26 years, any President having such contention and such diversity of opinion to deal with as Mr. Stevenson had had. He had their sympathy, and he deserved it; and he (Mr. Jones) had no doubt whatever that they would agree that he merited an unusually cordial vote of thanks on this occasion. He had no doubt his proposition would be carried unanimously by acclamation.

Mr. Hepworth seconded the motion. He said he was not present on the previous day, because he felt some delicacy about attending; but he had heard a great deal about the difficulties the President had had, not only at the meeting, but during the year. He could quite imagine the amount of anxiety he must have had to bear on behalf of the Institute, in carrying out these complicated and important negotiations, which resulted in the resolution proposed on Tuesday. They all knew Mr. Stevenson's great ability; and he was perfectly sure that in everything he had done he had sought to further the interests of the Institute, and had done it with a dignity which became the name of Stevenson. He (Mr. Hepworth) could only say that the strongest support the resolution could have had been already given by the extraordinarily hearty way in which the motion of Mr. Stelfox was received.

The vote of thanks was carried by acclamation.

The President, in responding, said he had not thought that his services would be regarded so highly as they seemed to be by so many gentlemen, even those who opposed what was suggested the previous day. He might say distinctly that he did not object to "hard knocks" from anybody, for he was accustomed to them. He got them every day of his life in the session, if not from other people, from his own old evidence, which was brought up against him. He had not felt hurt on account of any of the hard knocks, which he considered had been legitimately made; but he must say that more than once during the progress of the discussion, like Mark Twain, he made many vows, and like him he should perhaps find that, although there was great pleasure in so doing, there was greater pleasure in breaking them. It was said that second thoughts were best; and perhaps his second thoughts might be different from what they were on Tuesday. He felt that the Institute did wish, generally speaking, to amalgamate with the Institution; and he only regretted, and deeply regretted, that the motion now carried could not have been made on the previous day. He was very sorry, too, that more members did not attend. Out of the 600 who had the right to vote, only 150 came to exercise it on a momentous question like the one they had had before them; and he hoped that, the next time it came forward—and doubtless there would be a next time—every member who possibly could, whether he was in favour of the motion or deadly

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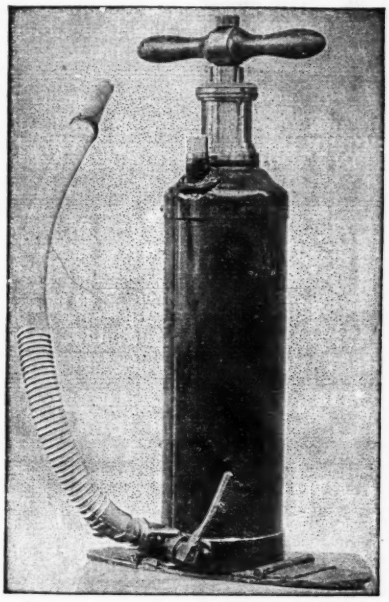

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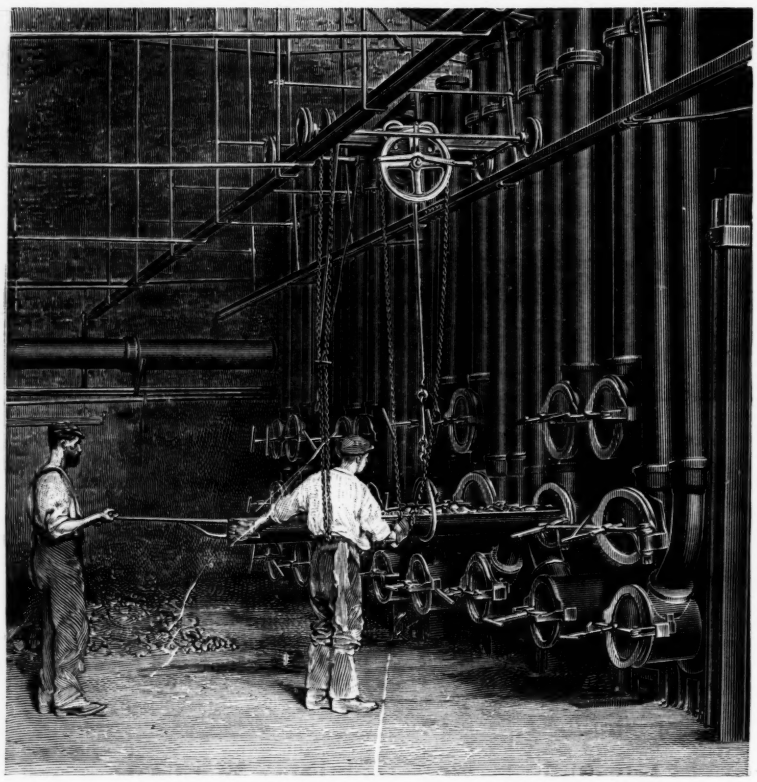

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opposed to it, would come up and vote, so that they might get the real mind of the Institute upon it. They did not want to effect amalgamation simply because the large majority did not attend; for this would simply mean trouble hereafter. They wanted the majority to show that they did desire amalgamation; and they should come and do this by their votes. He begged to thank them with all his heart for the way in which they had carried this vote of thanks.

Mr. W. W. HUTCHINSON then proposed a vote of thanks to the Auditors.

Mr. H. WIMHURST (Sleaford) seconded the proposition, and it was carried.

The PRESIDENT said he had next to propose a vote of thanks to their Honorary Secretary, which he knew would be accorded to him as heartily as possible. Mr. Dougall had served them well for five years, and had had his vote of thanks each year; but this year he was going to have it, and something more. The little present referred to on the previous day had now arrived; and as it had been chosen by Mr. and Mrs. Dougall, the members might be sure that it would be acceptable to them. It consisted of a silver salver upon which was the following inscription: "Presented to Andrew Dougall, Esq., by the members of the Incorporated Gas Institute, in recognition of his valuable services as Honorary Secretary during the years 1896-1900." With this there was a box of fruit knives and forks, also in silver. In the name of the Institute, he had much pleasure in presenting Mr. Dougall with these articles, which he did not doubt he would often use. It was only a small recognition of the services he had rendered.

The vote of thanks was carried by acclamation.

Mr. DOUGALL, in reply, said he could not find words to thank the members for this expression of their appreciation of his services. It had been a very pleasant time to him; and he was glad to think he had had the loyal support of the Council throughout his term of office. He had formed many friendships, and had felt amply repaid without any such recognition as that which he had just received; but he should highly appreciate the present, and round it would cluster many pleasant memories of the time when he had such close contact with the members of the Incorporated Gas Institute. He had now to propose a vote of thanks to Mr. Dunn, the Secretary, who really did the work of the Institute—the Honorary Secretary being only an ornament.

Mr. T. N. RITSON (Kendal) seconded the motion, which was carried unanimously.

Mr. DUNN briefly acknowledged the vote, and the proceedings terminated.

THE LECTURE.

"THE NEW GAS."

By W. H. Y. WEBBER.

I feel that an explanation is due to such an audience as I have the honour of addressing on the present occasion for the application to my discourse of what must to many of you have been a puzzling title. Those members of the Institute whose recollections run back, like my own, over a considerable period of time, will remember having had their attention called to more than one "New" gas. Indeed, this brood has been a numerous one; but although they all claimed to be different from everything else of the same name, they shared the congenital weakness which invariably carried them off before they had struggled far on in the world. No "New" gas ever grew old. Latterly, the strain of this brood has sadly degenerated. The last I saw was a callow bantling hatched in Lombard Street, which professed to make gas sufficient for lighting a large country house for six months from twopennyworth of some mystery poured into a tin box. You then struck a light, and the patentee did the rest. I fear that this particular brand of new gas perished in the shell.

It is hardly necessary for me to assure you that I do not propose to waste your time on anything so preposterously novel, so lamentably stale, as this kind of new gas. I will own at once that there is no novelty at all about my so-called new gas. Perhaps the best illustration of the sense in which I use the term in this particular connection is to be found in that supremely beautiful phrase of Tennyson, in which he describes how the awakened Princess and her lover departed—when

> "Far across the hills they went
> In that new world which is the old."

For it is truly of a very old gas indeed that I propose to speak: Of that common coal gas which your predecessors made, because they could do no other, by methods and means to which those actually in use preserve so strong a family likeness. A gas which they and their employers went on making and selling through good and through evil report; because they believed in it. A gas which has kept its market, and done good service to civilization, despite the sneers of the superior scientific person and the adventures of the perfervid inventor. A gas which now, only now, years after its supersession as a staple manufacture has been proclaimed from lecture platforms and in the Press throughout all lands, is being awakened to a new destiny and an inheritance widely differing from, and greater than, anything that either its friends in the past or its enemies of the present have ever suspected to be in store for it.

I mean to say that while the gas is old, being none other than the honest, unsophisticated coal gas of our fathers, as a resource of the material civilization of the coming century the gas is new; because it will be produced according to a reformed principle of manufacture, and will be used for a totally new service. I am aware that this declaration is not news. You who are gas makers and vendors can read the signs of the times as well as I can. But although every man carries his own watch nowadays, and does not really need anybody to tell him the time, we still erect and keep in action town clocks for all to see. So it has commended itself to your Council that I should call the time of day for the British gas industry at this meeting, and so enable the Institute to place upon its records the fact that it took cognizance betimes of the coming of that industrial revolution which is certain within a few years to put a different face upon British gas undertakings, public and private, and the consequences of which no man can venture to predict.

It has long been the aspiration of scientific workers that something which they vaguely qualified as "cheap fuel gas" should be made available for general consumption, as coal gas was for lighting. More than once it has been fondly imagined that the *desideratum* was supplied. In turn, water gas, Siemens gas, and the blend of the two now called Dowson gas promised to be suitable for the purpose. Not long ago, all these varieties of gaseous fuel, and everything else of the kind that could be made to order, were exhaustively tested by the Westinghouse Company with a view to distribution for fuel purposes, when the natural oil-gas supply of Philadelphia should give out; and the result was to demonstrate that only coal gas and carburetted water gas could be economically generated at manufacturing stations and distributed. I need not go over this old ground. The literature of the subject is vast; and knowledge of the facts is part of the regular professional equipment of gas engineers. It is worthy of note, however, that on the occasion of the meeting of this Institute in the city of Birmingham, in 1881, the late Sir W. Siemens delivered a suggestive address advocating a system of duplex coal carbonization, in which two-thirds of the make should be reserved for sale as "illuminating gas," while the remaining one-third would be diverted into another channel for sale separately as "heating gas." This portion of the make he distinguished as "light gas," because it was not overloaded with the heavier hydrocarbons.

This arrangement was defended in these remarkable words, to which later experience has given deeper significance than the eminent speaker could have anticipated. He said that "the heating gas, although possessed of an illuminating power of only 11·05 candles, would be preferable to the mixed gas for heating purposes, in being less liable in its combustion to deposit soot upon heat-absorbing surfaces, and in giving, weight for weight, a calorific power superior to olefiant gas." At the same time, although Sir W. Siemens had no idea of the possibility of burning gas for illuminating purposes otherwise than with the self-luminous flame, he admitted that this was an extravagantly wasteful way of procuring light, as not more than about 1 per cent. of the calorific energy developed in the combustion of the gas was really utilized in the production of luminous rays. How gladly, therefore, would he have seen the system superseded by something more economical!

At the meeting, the late Mr. F. W. Hartley, Mr. Sugg, and other practical-minded persons, duly poured a large

quantity of cold water upon Sir W. Siemens's duplex-carbonizing suggestion; but Mr. W. Foulis was already free to admit that, although he "still had his doubts about it," his experiments "seemed to indicate" that "gases of low illuminating power were better suited for heating purposes than gases of high illuminating power." I am sure, gentlemen, that nobody could expect a Scottish gentleman to express himself upon the subject more positively than this, at the period to which I refer!

It is very impressive, as one reads up the record of men's thoughts of bygone times in the light of later events, to mark how they have fumbled round a locked door without ever finding the key, although it lay near at hand. Nineteen years is not so very long to look back over. Most of those who listened to Dr. Siemens, as he then was, are happily still with us, only a thought grayer; but their speeches on that occasion ring strangely archaic. Something has happened since then to put a different face upon the use of gas for lighting. We can, however, applaud the strong good sense of the then President, Mr. Charles Hunt, who was convinced that a duplex supply was not the right way to bring in fuel gas. Mr. Hunt, by the way, was the only speaker on this occasion who was blessed with a bit of the prophet's mantle, for he observed that "he very much questioned whether, if a consumer had the choice between 18-candle gas at a high figure and 11-candle gas at a low one, he would not choose the latter."

In the course of this historic debate, moreover, much was said about the desirability of cheapening town's gas; and the familiar question arose of when such gas might be regarded as "cheap enough" for this or for that use—a most important problem, which is not susceptible of a general solution, although such a way of regarding it has been much favoured by municipalities who ought to have been better inspired. This view of town's gas, as to its being cheap enough at 2s. per 1000 cubic feet or thereabouts (or even when it is as cheap as the same product in the next town) is, in fact, a superstition descending from the period, before 1881, when illuminating gas was conventionally regarded as dispensed wholly for one principal use—that of giving light by its luminous flame; and was a luxury for the well-to-do. The trail of this superstition is all over the Birmingham discussion, which proceeded on the tacit assumption that if there were to be such a public service as that of fuel gas, this must necessarily be something totally different from the ordinary town's gas. The suggestion was contemplated as foreshadowing a new and distinct branch of a gas company's business; and this view was sustained by the belief that the illuminating power of the luminous flame of the lighting gas must be maintained at a high photometric standard.

Consequently, the idea of a heating-gas branch for gas undertakings fell flat. It could not be worked; and there the matter rested for awhile. Professional opinion, the Legislature, and public wishes tended to assign importance to the conventionally-measured luminosity of town's gas. For some years it became usual to increase the illuminating power of town's gas from 12 to 14, 15, and 17 candle power, with the idea of giving the people good value for their money. Local authorities everywhere insisted upon screwing up the statutory illuminating power of the gas supplied by companies; and when they had the supply in their own hands they, in many instances, voluntarily gave their public the same imagined advantage.

The Board of Trade returns exhibit the effect of this usage in gas manufacture by the number of gas undertakings which claim to supply gas of a much higher illuminating power than their legal requirements. I call this era—the era of enhanced conventional illuminating power of town's gas—the Dark Age of the British gas industry. It was the period when the good folks of Edinburgh and Glasgow groped about grumbling in the semi-darkness of their high-candle power gas; and when it was the fashion of those who knew no better to envy them this splendid privilege.

Looking back at this period, one can now perceive that the gas industry at the commencement of the eighties was really at a perilous pass. Electric lighting was coming in, and to this charming novelty gas could only oppose a time-worn face, destitute of any pretence to that indefinable but irresistible attraction which we call "the fashion." When it was decided to hold a Gas Apparatus Exhibition at the Crystal Palace in 1882-83, although something had been done in the way of improving burners, I had the best means of knowing that more than one prominent member of this body was in despair of making anything like an attractive or novel show of gas lighting. What was eventually done was imposing rather than truly convincing. All the improved gas-lights were large burners, vieing with the arc lights; and the Nave of the Palace was as a huge gas-stove. There was nothing in gas-burners to meet the incandescent electric light on its own ground. The gas people were like those who, finding themselves in the company of persons speaking a strange tongue, try to make themselves better understood by shouting.

Consequently, it is no wonder the new comers into the lighting industry contemptuously bade the gas people cultivate a kitchen and factory trade, as their lighting connection would certainly depart from them. The electricians declared that the only proper employment for gas was as a fuel; and events have justified this judgment, albeit in a manner that those who pronounced it neither expected nor desired.

The defenders of the gas industry about 1880 warmly objected to be dismissed from the streets, the shops, and the parlours; and they had reason. What are generically called the daylight uses of gas were then only beginning to assume commercial importance. The Otto gas-engine had just come into the market; gas cooking-ranges were being tentatively taken up by the most progressive gas companies, but the manufacture was in few hands; and gas heating was practically unknown. Gas companies looked very blankly at this small department of their business, and could not see their accustomed dividends in it. They clung to their lighting trade; and, very fortunately for them, the provisional system of lighting by regenerative burners came into being just in the nick of time to save this market.

All this time, nothing occurred to disturb the belief of experts in conventional illuminating power as a necessary quality of town's gas. If the gas found a subsidiary market as fuel, so much the better; but the lighting was the mainstay of the business, and lighting could only be satisfactorily done by the aid of illuminating power. In America, one of the reasons assigned for the substitution of 25 and 26 candle carburetted water gas for the older and cheaper 16-candle coal gas was the pressure of competition with the electric light. In the United Kingdom, the systematic enrichment of common coal gas to an artificial brilliancy was tacitly accepted everywhere as a necessity.

I am unable to ascertain when the practice of deliberate, systematic enrichment, or carburetting, of common town's gas became a settled thing in English gas-works. There is no mention of either of these familiar words in the index of "King's Treatise on Coal Gas." The occasional use of a sprinkling of cannel in ordinary gas making came in with clay retorts, high makes, and exhausters; and there were always many grades of gas between the product of sea-borne North Country coal, and the article which made darkness dimly visible in Scotland. But enrichment or carburetting, strictly so called, only came into vogue when the stand-by cannel pile disappeared from its old conspicuous position in the gas-works yard.

Curiously enough, contemporaneously with the professional acceptance of the practice of common coal gas enrichment as a concession to the requirements of the public, and the endorsement of the higher standard by Acts of Parliament and the resolutions of gas-supplying English municipalities—signalized by the increase of the statutory illuminating power of London gas from 12 to 16 candles, and the general "screwing-up" already mentioned—Glasgow and other places grew sick of supplying too rich and heavy a gas, which they had learnt by painful experience was—

> "A creature far too bright and good
> For human nature's daily food."

And in 1892 the Gaslight and Coke Company ceased to supply their so-called cannel gas, of 20-candle power, in the West-end of London.

It was still held in England as an article of professional belief that no respectable gas undertaking ought to send out gas of less than 15-candle power, although it gradually came to be understood, even in Scotland, that gas of much more than 20-candle power is a thing of the past. Great credit is due to Mr. Foulis for his single-handed victory over ancient prejudice, won in the face of bitter opposition, in the interest of the people and city of Glasgow. I am speaking now, be it observed, from the point of view of the gas manufacturer. This partial levelling-down of the standard of conventional illuminating power proceeded on purely industrial grounds; so that, even if it were open to be argued that the future of

the British gas industry depended on the restoration of the old Scottish standard of illuminating power all over the country, this contention would not alter the unfavourable industrial facts. People would have to go without cannel gas of the old style, however badly they might think they needed it, for the same reason that they have to dispense with many other things classed as luxuries, generally with little reason.

Into a technical world so diversely influenced by conflicting currents of wishes and economic considerations, Dr. Auer von Welsbach, five years later than the era of the "perilous pass" to which I have already drawn your attention—to wit, in 1885—dropped an invention which had the astonishing effect of solving, in a wholly unattended manner, the old problem of establishing a town's supply of fuel gas as distinguished from lighting gas. His incandescent burner it was which turned all town's gas into fuel gas, without for some time anybody marking the change. People soon began to take stock of the new burner; but it is scarcely yet realized that its appearance practically made a new gas.

Yet this, Mr. President and gentlemen, is the very pith and point of my address. This is the time of day which has struck, and which this Institute is going to register on the town clock of the gas industry, sounding here, and now, for the enlightenment of the technical world.

Dr. Auer von Welsbach wrought better than he knew, although no inventor ever more richly deserved all the rewards he has received for an invention which was no mere happy thought—no chance hit—but represents profound knowledge of the means, painfully brought to bear upon the attainment of a desired object, and guided by native genius. Whatever share others may rightly claim in perfecting the incandescent gas-light, let it never be forgotten that the whole luxuriant crop of these burners and their accessories is from seed which Dr. Auer supplied, as this Institute fitly recognized by making him a Birmingham Medallist. Dr. Auer is, indeed, *the* Birmingham Medallist; for it is to him that the gas industry owes the simple, easy, and natural solution of the puzzle that discomfited all the wise and skilful experts at the Birmingham meeting who heard Dr. Siemens, and also, during the same meeting, established the medal which was to signalize the unknown Œdipus whom the Fates were reserving to answer this riddle of the Sphinx.

For such it was, as we can now see. Something had to be done to put new life into the old industry. The riddle was to be answered, on pain of death. The answer came. Scarcely had the enemies of gas lighting begun to cry, "See! it is dying—it dies!" than Dr. Auer was able to answer, "Not so! It lives again, brighter, fairer, stronger than ever! You bade the gas makers turn their attention to heating applications. Here is one you thought not and will like less to see!"

I do not propose to discuss the Welsbach invention as such; but only to elucidate its reaction on the gas industry. The chief result of the permanent success of the new method of obtaining light from gas is, as I have already remarked, that it has turned town's gas into fuel gas pure and simple, thus superseding the convention of illuminating power of the luminous flame, and all that this entails—enrichment, photometry, and all the squabbling and local unpleasantness about "bad gas." There need never be any more of these familiar grumblings—most frequent, be it observed, in places where the standard of illuminating power was highest. Not only so—the very price of gas ceases to be felt as a check to those who like the most brilliant lighting and plenty of it. Possibly I may hear somebody say "Not so fast! The incandescent gas-light is all very nice, so far as it goes; but I have yet to see that it is likely to become universally popular, to the exclusion of the luminous flame, or that even so it will cause any radical change in the method of gas manufacture such as will materially cheapen the product."

To such an objector I would reply, "Come to Germany, where I will show you things that shall be here, in due course." It so happens that Germany did not give the Welsbach, or the Auer system as they call it on the Continent, any patent monopoly whatsoever. The result has been that the system has for years been worked there on all hands strictly on the commercial basis. The manufacture of mantles, burners, and all the accessories has progressed enormously; and the whole trade is far more advanced and improved than it is in any country where the patent monopoly has kept it in one proprietorship. There are half-a-dozen well-reputed makers of incandescent mantles for the German market. The gas companies, who are the largest buyers, get them at from a penny to twopence apiece; and the burners cost ninepence. A good incandescent lighting fixture, complete with burner, mantle, reflector shade, and Jena chimney, can be had, fixed, for about 2s. 3d. Of course, there are better qualities. Consequently, German towns are brilliant with the brightest and cheapest light known to science.

I have counted 15 and 17 incandescent lights in a half-front shop window, all good and in perfect order. This is how they do it: The gas company, or sometimes a big gas-fitting firm in the town—for there is perfect free trade in the matter—have a system of replacing defective mantles, &c., at a uniform charge of about 6d. apiece. This includes everything from the "gallery" upwards—clean burner, new mantle, mantle carrier, and new chimney. The old fitting is taken in exchange. When a consumer sees a light going wrong, he telephones word to the proper quarter, and all the rest is done for him. There are never any complaints of "bad gas." The gas administration see that the service-pipes, the meters, and the internal fittings are of ample size. They also keep up an adequate gas pressure, and make sure that the mantles are good. Poor mantles, which lose their lighting power quickly, and get out of shape, have no sale in Germany.

Broadly speaking, in the most advanced of German cities, and wherever the gas company do their duty and work in a businesslike style, there is now nothing else but incandescent gas lighting. Berlin has gone past electric lighting, and will have nothing but incandescent gas in the streets. All over the wide region covered by the German Continental Gas Company, of which Herr W. von Oechelhaeuser is the go-ahead President, the last year's *increase* of burners on the Company's books was divided as follows:—

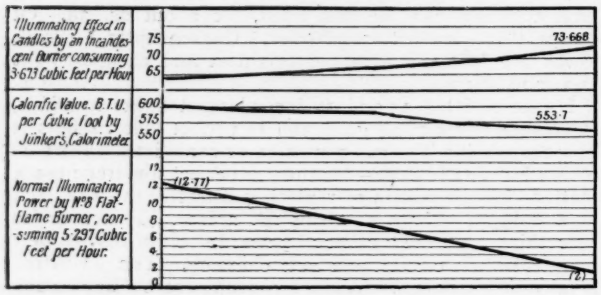
Incandescent burners	21,842	= 91·64	per cent.
Flat-flame	,, 1,895	= 7·95	,, ,,
Argand	,, 98	= 0·41	,, ,,

And the replacement of old luminous-flame burners by incandescents is going on everywhere with similar rapidity. The regenerative lamps have gone utterly. Indeed, one has to hunt for a luminous-flame gas-burner in Dessau or Magdeburg. The Gas Company aver they cannot afford to use them. Incandescents are in all the retort-houses and workshops—the "Gem" pattern, with air holes in the side of the chimney, being preferred for this use. Moreover, with 50 per cent. of the daily output sold for cooking, heating, and motive power generation—as in many cases here—the element of illuminating power dwindles into insignificance on all sides.

This being the state of the case, the practical German mind has already realized that the gas manufacturer has for the future to sell fuel gas only. The next point to be determined is, what obligation this entails upon the manufacturer. Will he have to change his methods? This raises the question of what relation the conventional illuminating power of town's gas has to its fuel value, with special reference to the performance of the incandescent thorium-cerium mantle. In order to settle this query, Herr W. von Oechelhaeuser arranged for a crucial experiment, which was carried out by his Secretary, Herr Schaefer, at Dessau, who was good enough to tell me all about it. The results of the experiment are shown on the diagram (p. 1630). They can be checked by any of you—the more the merrier!

What was done was to fill an experimental gasholder with ordinary Dessau gas, which indicated an illuminating power of 14·7 Hefner units (12·77 English candles) at starting, burnt at the rate of 150 litres (5·297 cubic feet) per hour in a No. 8 flat-flame burner. It was then deprived of its benzol by filtration through a box containing wool steeped in "green" or creosote oil. The calorific power of the same sample at the start, by the Junkers calorimeter, was 5320 calories per cubic metre. This is about 600 British thermal units per cubic foot. The diagram referred to is an exact copy of the one submitted by Herr W. von Oechelhaeuser to the German Gas and Water Works Managers' Association at Cassel last year, converted to the ordinary English equivalents of the metric measurements. What Herr von Oechelhaeuser wanted to learn was, whether the public who buy gas would suffer if the ordinary quality of town's gas, which in Dessau has to be carburetted even to make it read about 13 English parliamentary standard candles, were sent out uncarburetted, just as it comes from the usual run of German gas coal. This coal, which is mined in Westphalia, only makes from 7 to 9 candle gas,

Lighting-Effect by the Incandescent Burner and Fuel Value of Coal Gas deprived of its Normal Illuminating Power.



These experiments were made at Dessau, in May, 1899, by Herr Schaefer, under the direction of Herr W. von Oechelhaeuser, with an Auer mantle previously used for 300 hours. The gas was progressively deprived of its benzol by being passed through "green oil." The results have been converted into English equivalents by the Author.

when thoroughly worked off at the rate of about 10,700 cubic feet per ton; but the coke is good.

You will see by the diagram that as the gas was unloaded of its benzol enrichment, and the normal illuminating power fell, the duty of the incandescent burner used actually rose, so that users of these burners would get better value for their money; while the calorific value dropped very slightly—too little to be noticeable in the working of gas stoves or engines. This result was confirmed by pushing the experiment to the extreme limit, when the illuminating power of the gas went down to 2 candles. At this point, I expect, an ordinary London gas examiner would have a fit at the appearance of the test flame; but Herr Schaefer was in search of cold, hard facts, and he found that this almost non-luminous gas was capable of activating the Auer mantle to the tune of 73·668 candles illuminating effect for a consumption of 3·673 cubic feet per hour.

Dr. Bunte corroborates this most important record, which I take the liberty of styling the "Magna Charta" of the "new" light gas industry, by an independent demonstration that methane and the heavy hydrocarbons of lighting gas, although possessing a high calorific value, do not activate the Welsbach mantle so effectively as hydrogen. Hydrogen, moreover, is the only gas that will act upon the self-igniting preparations now being introduced for use with incandescent burners. The facts being as stated, and the scientific and practical German intellect being singularly devoid of prejudices, it naturally follows that in Germany the age of heavy, loaded, unnecessarily costly town's gas is over.

The best examples of the beginning of this silent revolution in German scientific gas manufacture must be sought for the present among the emancipated municipal works; the gas companies being still bound by the terms of their concessions to sell gas which must be enriched to the by no means elevated standard of 13-candle power English. The municipal gas undertakings, however, no longer buy benzol in quantity; and they confine their purchases of coal to the cheapest and most serviceable native products.

The first Gas Manager of Germany to declare for light gas was Herr Dieckmann, the far-sighted Engineer and Manager—the Herr-Director as he is called, which means this and something more—of the municipal gas undertaking of Magdeburg, a city of 250,000 inhabitants, the capital of Prussian Saxony, and a very rising, flourishing centre of trade and manufactures. Magdeburg town's gas is supposed by a legal fiction to be of 13 Hefner units illuminating power; and the official Examiner duly tests it daily. I was there in the middle of March; and the following are the official returns of the illuminating power of Magdeburg gas for the first part of the month :—

1900.	Hefners.
March 1	12·1
,, 2	11·2
,, 3	10·9
,, 4 (Sunday)	8·5
,, 6	11·3
,, 8	12·0
,, 9	11·7
,, 10	11·0
,, 11	10·7
,, 12	11·4
,, 13	11·9

On Sunday, March 4, there was something wrong at the works, and the gas was sent out of the low illuminating power of 8½ Hefners, or 7·45 candles; but nobody in the town noticed it. The above figures should convince those who prefer the ounce of fact to the pound of theory. Oechelhaeuser, Bunte, and Schaefer arrived experimentally at the conclusion which the gas consumers and the Municipality of Magdeburg have reached by experience—that, with modern methods of gas lighting, normal illuminating power is nothing. Magdeburg never gets gas of more than 10½-candle power. This matter of normal illuminating power does not interest Herr Dieckmann at all. He makes gas as well as he knows how from the ordinary run of Westphalian coal which his Committee buy for his use; and he knows that so long as the consumers get gas enough, and the incandescent mantles are good, the public will be satisfied. This state of things has gone on for over a year.

Although he sets no store by illuminating power, Herr Dieckmann pays particular heed to the calorimeter testing of his gas, which is done at least once a week, by Junkers' instrument. I give the official records for the month of December last :—

1899.	Calories per Cubic Metre.
Dec. 4	5417
,, 12	5376
,, 19	5359
,, 23	5258
,, 27	5426
Average	5367

I ask your attention to two things revealed by this record. First, that the amount of variation of the fuel value of the gas for the whole month of December, when the works were busiest, is remarkably small; being only 168 calories per cubic metre, or 3·2 per cent. on the lowest figure. The range of illuminating power for the same time, if one may take the March testings as an illustration, would be at least 12½ per cent. on the minimum. This shows what a vacillating quality the normal illuminating power of town's gas is, and also what good, steady fuel any common coal gas is.

The second important point is that the uncarburetted Magdeburg gas, with its mean of 10-candle power, averages 5367 calories per cubic metre, or, as I make it, about 606 British thermal units per cubic foot; whereas the carburetted Dessau gas is shown by Herr Schaefer to give no more than 5320 calories, or 601 British thermal units per cubic foot. Evidently, therefore, the added benzol in the latter gas does not count for much as fuel.

An interesting development of the teachings of the calorimeter, as a guide to gas making, is announced by Herr Dieckmann. Although the cheap and serviceable Westphalian coal—the common gas coal of his native land—suits him well enough, he is rather uneasy under the reflection that in depending wholly upon this material he has all his eggs in the one basket. Strikes and coalowners' rings are not unknown even in the happy Fatherland; and for this reason Herr Dieckmann proposes to get a Humphreys and Glasgow carburetted water-gas plant, with which, by the aid of a native schist oil, he will make a gas of as near as possible 8-Hefner power. He has satisfied himself that this gas will possess exactly equal calorific power with that now supplied to the town; and this is all he cares about. *Thus at last the photometer has come to play hand-maid to the calorimeter.* If this simple circumstance does not prove the completeness of the revolution in gas manufacture I have attempted to describe, I should like to know where to find a better symbol of the change.

One word as to the character of this instrument, a specimen of the latest form of which I have on the table before me. Its use is extremely easy; and the result is positive and unconditional. We all know that the photometry of gas is very much the opposite of this; it is conditional to the last degree. The standard of light; the construction of the test burner; the rate at which the gas is consumed; the quality of the photometric screen; the personal equation of the operator; his carefulness in seeing that all the circumstances are normal and in making all the necessary corrections to arrive at an approximately true result; the temperature of the room; the humidity of the air—all these factors affect the operation, some of them to an unknown and undeterminable extent. On the other hand, the measure of the calorific power of gas is simply the number of degrees of the thermometric scale by which the temperature of a certain weight of water is raised by the heat of burning a certain quantity of gas. There is little chance of error here; and I am able to cite Dr. Harold G. Colman as testifying to the Institution of Gas Engineers last month, from several years' experience, not only that the Junkers calorimeter is a satis-

factory instrument, but also that it is a far more satisfactory instrument than any photometer.

I should like to remind you here that the first practical gas calorimeter was made nearly 20 years ago by our late good friend Mr. F. W. Hartley. His instrument was used to ascertain the fuel value of the gas burnt for the various experiments on gas cooking and heating appliances carried out for the Committee of this Institute on the Gas Section of the Gas and Electrical Exhibition, 1882. This work of Mr. Hartley's was in advance of the times; but those who compare the Hartley calorimeter, illustrated and described in the Report on the Gas Section of this Exhibition, with the later instrument now in the market, will do justice to the pioneer work of our old friend, and join with me in regretting that it received so poor a welcome in this country.

Since I undertook to deliver this lecture, another ounce of fact has come into my possession to support the main argument. This is the example of Bremen, the Liverpool of Germany. The Director of the municipal gas-works of this thriving North German port, Herr Salzenberg, has advised his Committee, and the Committee have agreed, that the splendid new gas-works which the growth of the town has necessitated shall inaugurate the new *régime* of light gas. Hitherto Bremen, like Liverpool, has had one of the highest illuminating power town's gas in all Europe—20 English candles per 5 cubic feet, or, to be more exact, 12 candles for a consumption of 91·6 litres per hour. This gas was made from a blend of two-thirds high-grade English or Scotch gas coal with one-third German coal. At the old works, a carburetted water-gas plant by Humphreys and Glasgow was also installed, and helped to cocker-up the make to the approved standard.

The local prices of gas have been—

	Per Cubic Metre.		
For private lighting . . .	20 pfs.	=	(5s 8d. per 1000 c. ft.)
,, heating and cooking . .	15 ,,	=	(4s. 3d. ,, ,, ,,)
,, power	12 ,,	=	(3s. 4d. ,, ,, ,,)

The Gas Committee have decided to make a big cut in these rates, as they can well afford to do by reason of the abandonment of their highly carburetted gas manufacture.

The new scale of prices is:—

	Per Cubic Metre.		Per 1000 Cubic Feet.
Private lighting gas . .	16 pfs.	=	4s. 6d., decrease 20 per cent.
,, heating . . .	12 ,,	=	3s. 4d., ,, 20 ,,
,, power . . .	11 ,,	=	3s. 1d., ,, 9 ,,

There will be *no standard of illuminating power* under the new dispensation. Herr Salzenberg confines himself to the general declaration that the gas will be such as will come out of the ordinary run of Westphalian (Ruhr basin) coal without cannel or other enrichment. The calorific value of the new gas, he admits, will be somewhat less than that of the costly article hitherto made, which he states at about 700 British thermal units. This is probably about right for such a heavy gas. The light gas, he expects, will show a calorimetric reduction of about 10 per cent.

As the selling price is to be reduced by 20 per cent., this exchange means a bonus of 10 per cent. to the consumers. As to the effect of the change on the performance of the incandescent burners, Herr Salzenberg pins himself to the promise that there shall be no falling off in the lighting value per unit of consumption. On the contrary, he thinks the duty of the incandescent burners will be improved. So Bremen joins the procession of the enlightened German cities whose frugal citizens know how to get the most value for their money spent on gas; and declines to spend another pfennig for an enrichment of its gas which is so only in name. Town after town is actually consenting to be supplied at this moment with gas indicating from 7 to 10 candle power English; and they are the most brilliantly lit towns in Europe. Moreover, gas from being a luxury of the well-to-do, and burnt chiefly by the commercial classes—which accounts for its being hitherto about double the English prices—is being taken to eagerly by the mass of the population, through the prepayment meter. From being a slowly-growing industry, annual increases of as much as 20 per cent. of the output are being recorded by German gas undertakings.

Hitherto no universal reduction of price has signalized the revolution in German gas manufacture, because the change has nowhere been so great as in Bremen; but those concerned in it are thankful that they have not had to face serious increases of price in consequence of the dearness of English coal and the colliery-labour troubles in Bohemia, whence they used to obtain their cannel. They find that the nominal price of lighting gas has become of small moment; having been reduced in effect to one-sixth, or thereabouts, by the incandescent burner. Light-gas making may not immediately cheapen the product everywhere, at the consumers' meters; but it is bound to prove economical in the long run. Coals and other hydrocarbons hitherto unsuitable for gas manufacture are now open to the gas manager; and the new business that is crowding in upon him will have the natural result. Not least of all these considerations is the relief of English coal deposits of the best quality from a large foreign drain for gas making.

Before concluding this lecture, I ask your indulgence for a quotation from the Third Volume of "King's Treatise," which was published in 1882. In the chapter on "The Production of Illuminating Gas from Materials other than Coal," the author discussed the question of gas enrichment, or carburetting, by mixing the materials of manufacture, together with the contrary practice of reducing a rich gas to a manageable power by the addition of air or a non-luminous gas. He said "there is no doubt that, so far as they extend on similar lines, both processes are equally wrong. When the gas from any material is sold in the highest condition, as regards illuminating power, at which it can be taken out of the material, without the addition of anything else, it may be laid down as an incontestable rule that the most favourable conditions of manufacture are fulfilled . . . it will be a safeguard against error of the gravest kind if the fundamental truth here laid down is always borne in mind when cases in which it is involved are considered."

I found myself, in 1900, so thoroughly in agreement with this strong pronouncement of 1882, that it was with quite an agreeable shock that I found myself reminded, in the preface to this volume, that the writer of the chapter was a certain W. H. Y. Webber. I at least had forgotten that the law of economical gas manufacture had ever been laid down at so early a date, when the gas-maker was very much more closely "cabin'd, cribb'd, and confined" as to his coal, cannel, or oil resources than he need be to-day.

Germany, ever a foe to superstitions, has initiated for the industrial world another reformation. Dr. Auer gave the seed; Herr von Oechelhaeuser, Dr. Bunte, Herr Dieckmann, and others have planted and watered it; and we poor red-tape bound English shall be left in the lurch by the Germans in gas-making as in some other things, unless we take a leaf out of their book, and free ourselves from everything that operates in restraint of trade, and to the discouragement of industrial enterprise. Gentlemen! It is a magnificent, a boundless Land of Promise which lies before our industry. I invite you to disabuse yourselves of all prejudices and preconceived ideas regarding the public interest in the illuminating power of town's gas, as the photometer shows it. You already provide, through the agency of the incandescent system of gas lighting, the cheapest and most brilliant commercial artificial light in the world. You have already secured an enormous bulk of business in the way of distributed motive power, and of fuel for cooking, warming, and performing an infinity of industrial operations. You light the homes of the poor with economy and safety to life and property. Do not let any conventions stand in the way of your industrial expansion along all these lines, which are really one! I do not presume to promise what the result of the universal adoption of the new guiding principle in gas manufacture will be in individual instances. I do not offer you, who know your own affairs and circumstances so very much better than anyone else can tell you, any quack nostrum for making the old goose lay more golden eggs than ever. But I do claim that a new hour has struck for our common interest, a new page of technical history is about to be turned, and a new principle, or way of regarding and treating old elements, has been evolved; and I ask you to ponder the matter very seriously after you have gone home from this gathering, and I also pray your forbearance if in the endeavour to strike the hour, in the name of the Gas Institute, I have failed to rise to the importance and interest of the occasion and the subject.

The PRESIDENT observed that Mr. Webber's lecture was extremely interesting and edifying, and would give them a great deal of matter for thought.

Mr. J. STELFOX (Belfast), in proposing a vote of thanks to the lecturer, observed that Mr. Webber had undertaken the duties of the town clock; and he thought they would none of them be disposed to question his time, the distinctness of the dials, or his illumination of them. He regarded the

subject as most interesting. For a long time back it had occurred to him that it was no use adding another candle and another candle to the gas supply of towns, while probably two-thirds of the illuminating power was lost through the burners. Mr. Webber had shown them a way out of the difficulty; and he thought the lecture went to prove that public feeling was changing, and that they were within measurable distance of the German system. He did not think they would be left so far behind if the South Metropolitan legislation was to be looked upon as likely to set the fashion in the near future. Mr. Webber had given them all the information that it was possible to give on this interesting subject, and had placed it before them in a very interesting way.

Mr. W. HARDIE (North Shields) seconded the vote of thanks, and remarked that they must all have thought, on hearing the lecture, what a happy place Germany is. In England, they had not reached the stage when they could send out 7-candle gas into a town without being found out. If all that Mr. Webber had told them was correct, it would seem that the sooner they could get incandescent burners reduced to the low figures they had in Germany, and could supply the same quality of gas with the gratifying results obtained in that country, the better it would be for them. Mr. Webber had given them some facts which would be very useful; and he thought he had conferred a benefit on the Gas Institute by giving them this *résumé* of the position in which they stood to-day.

Mr. ISAAC CARR (Widnes), in supporting the vote of thanks, expressed regret on his own behalf, and said he thought that many gentlemen present would also regret, that this subject had not been brought before them in the form of a paper. The lecture was most interesting, and everybody must feel much indebted to Mr. Webber for having so ably placed the subject before them; but it was one which bristled with controversial matter. When they had a lecture, it was usually upon a special subject by a gentleman who had made it a special study; but this, he would submit, was a subject with which they were all equally familiar with Mr. Webber. Mr. Webber called the subject of his lecture the "New Gas;" but, according to the statement of a gentleman who had recently made a pilgrimage to Widnes to make investigations as to their gas, instead of being new gas it was very old gas. However, he was sure that the subject introduced by Mr. Webber would not be lost sight of, and that the excellent effect would be to bring the subject forward again—next time not in the form of a lecture.

The PRESIDENT said he would apologize if they liked, on behalf of the Council, for not bringing this subject forward in the form of a paper. Mr. Webber, however, was quite prepared to have the matter discussed, and would no doubt have enjoyed it; but their time being short this year, the Council had thought it better that the subject should be brought forward in the form of a paper at another meeting, when it could be discussed thoroughly.

The vote of thanks having been carried by acclamation,

Mr. WEBBER thanked the meeting for the extremely cordial way in which they had received the vote of thanks, and for the strained attention with which they had listened to what he had had to say. He was under the impression that he had made a special study of the subject, and fondly imagined that he was as competent to bring it before the Institute as anybody else. If he was wrong in that, he apologized; and if there were any weak points in the lecture he would doubtless hear of it. As the President had told them, he was asked if he had any objection to having the lecture discussed, and, of course, he had not the least. He would be glad to have it discussed as much as possible. He did not think there was anything controversial in the lecture. It might be controversial if he had told Mr. Carr how to make 14-candle gas in Widnes; but he did not tell any gas manufacturer how to improve his own business. The lecture was a record of facts that he had collected; and he had to express his gratitude to Mr. George Livesey for giving him the opportunity of collecting them, because he could assure them they had opened his eyes. When they went to Germany last September, they had an idea that gas was being made somewhat differently from what it was in England, and they were all glad to see that the most enlightened municipality in Germany, and probably in the world—that of Berlin—had done away with the electric light all over the city, and used nothing but incandescent gas. But, still he was not prepared to find that over 90 per cent. of all the new burners were incandescent, and that it was impossible to find a flat flame, except in a lavatory or a draughty passage where little light was really wanted. If they wished to see what a gas company could do when it was absolutely free from all red tape, let them go to Dessau, where they had the most magnificent gas company's factory he ever saw, and where they used nothing but gas-engines, and for lighting nothing but "gem" burners. They might depend upon it that the facts he had brought before them were facts which must in the long run operate deeply and widely in radically changing the point of view from which the technician and the public would regard common town's gas.

THE VISIT TO PARIS.

The number of members and visitors who signified their intention of joining in the excursion to Paris was unfortunately not so large as had been anticipated; but still, all told, they made a goodly number. Writing with a knowledge derived from a personal participation in the kindness the members received at the hands of their French *confrères*, we can say that those members who did not care to visit Paris, or who were unable to do so, were distinctly the losers. The company numbered a little less than 100; and, under the arrangements made, they had the choice of the two principal routes. About fifty ladies and gentlemen, or perhaps rather more, travelled by the Dover-Calais route; and the remainder *viâ* Newhaven and Dieppe. Those comprising the party who had selected the former route left Charing Cross at nine p.m.; the passengers including the President (Mr. E. H. Stevenson) and one of the Vice-Presidents, Mr. A. Dougall. The second party left Victoria by the 8.50 train for Newhaven. In both cases, special saloons and compartments were reserved; and on the steamers, thanks mainly to the attentions of the "man from Cook's," a fair number secured berths on the long-sea route. The night, however, was clear, the moon bright, and the sea smooth; and the temptation to remain on deck the greater part of the passage was strong. Under these favourable circumstances, Calais and Dieppe, and finally Paris, were reached early on Thursday with surprising nearness to the stated time. Both parties set out from London with a determination to enjoy themselves; and this they certainly have done to the full. It is difficult to see how, given fair weather, they could have done otherwise; for very complete arrangements were made by the Secretary and Excursion Committee, consisting of the President, the former Hon. Secretary (Mr. A. Dougall), Mr. J. Davis, Mr. R. G. Shadbolt, and Mr. T. H. Martin. Messrs. Davis and Shadbolt and the Secretary particularly deserve mention for the thoroughness with which they devoted themselves to the work of organization. Nor must we omit to prominently record the very graceful and generous aid rendered by the Paris Gas Company and the Société Technique du Gaz en France, to make the visit of their English friends a happy, pleasant, and memorable one.

Most of the members and their lady friends devoted the morning of Thursday to rest; but luncheon had to be taken early in order to keep an engagement with the Chairman and Directors of the Paris Gas Company, who had invited the visitors to journey by special steamer down the Seine to visit the Clichy station of the Company. On board, the members were received with exceeding warmth and graciousness by a large number of gentlemen connected with the Company—in fact, the greater number of the Directors and Engineers had assembled to honour their friends from across the Channel, and to testify their friendship and regard. We are afraid we did not secure the names of the whole of the gentlemen associated with the Company who took part in this event. But we may mention that of the party who, with much cordiality, received the visitors were M. Troost (the Chairman), M. Camus (the Governor), MM. de Gayffier and de Raynal (Directors), M. Godot (the General Manager), and MM. Euchène, Gigot, Audouin, Louvel, Brisac, Sainte-Claire Deville, Bertrand, and Supplisson. There were also present many members of the Société Technique—among them being the President, M. Th. Vautier, and MM. Thibaudet, Foucart, P. Mallet, Villeneuve, Ad. Bouvier, Chamon, Foiret, Foucart, Heeley, Hedde, and M. Raveau, the General Manager for MM. Lebon et Cie. And this does not by

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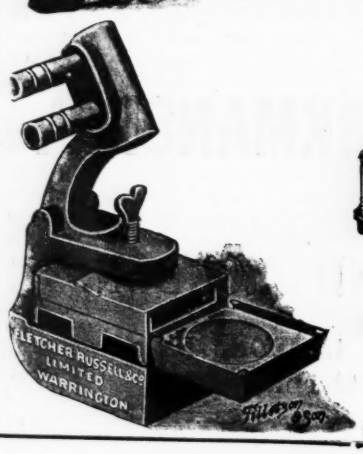


any means exhaust the names of the gentlemen present. The trip down the river was immensely enjoyed, as it afforded an opportunity for viewing some of the most picturesque and lovely environs of Paris, including Meudon, St. Cloud, the Bois de Boulogne, Suresnes, &c. After about an hour's journey, which was pleasantly passed in conversation, exchange of courtesies, and sightseeing, the Clichy Gas-Works were reached; and there the members found that their comfort had been studied even to the extent of constructing a special landing-stage and steps in order to reach the entrance to the works with the greatest convenience and minimum of fatigue.

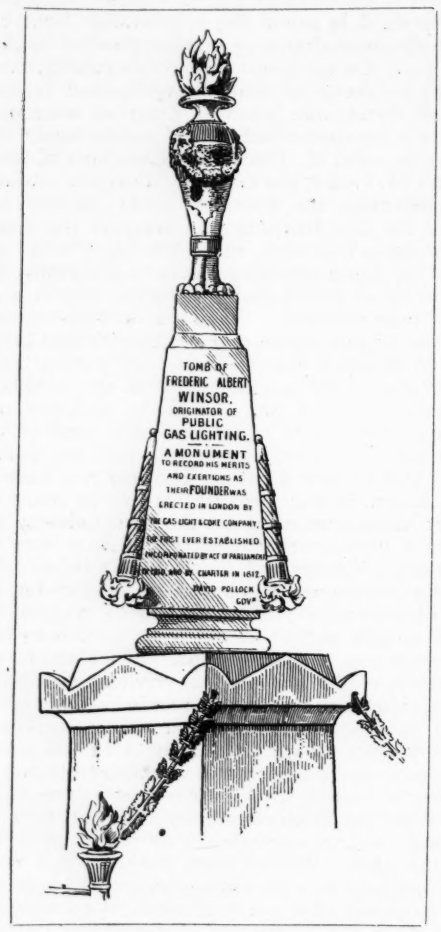
The works were found to be very expansive; and as they now stand, so they were originally planned and constructed, there having been no extensions since. The members were greatly interested in all they were privileged to see; and differences in practice and details of working were discussed with the utmost amicability and freedom. The first important part of the plant that they were taken to inspect was the pier, with overhead railway and means for elevating the coal from barges in the river and delivering it alongside the large retort-houses. The coal is raised by means of a 12-horse power gas-engine from the barges, in large buckets, having a capacity of about 1200 kilos. It is then transferred to small waggons on the overhead railway, and deposited at different convenient points near the retort-houses, into which it is delivered as required by means of hand trucks. The whole cost of transferring the coal from the barges to the point of consumption is placed at 7d. per ton. In and about the retort-houses, the greatest interest centred. It was found that what are called the Siemens-Clichy settings are employed. In England, the Siemens settings have been found wanting in many ways; but here they are successful to a degree which surprised many of the English engineers. In all, the houses contain 1500 retorts, 9 feet long, 26½ inches wide, and 14 inches high. They are of ⏢ section, corrugated, and set eight in a bed. The coal comes from the North of France. It is cheaper than English coal, but does not produce so much gas. It is also found that by its use the unpleasantness of stopped pipes has to be less frequently encountered. The make at this station is approximately one-fifth of the Company's entire output, which is about 325 million cubic metres, or (roughly) 11,500 million cubic feet. Perhaps the most attractive part of the operations on these works is the method of dealing with the coke. In the first place, the attention of the members was called to a drying plant for coke. The Company have to deliver a large quantity to the railway companies for locomotive purposes; and they are compelled to use it in a perfectly dry condition. Consequently, the Company have put down this drying plant for the purpose. It consists of a hot-air chamber about 77 yards long; and the coke is carried through it by means of conveyors. As it leaves the chamber, the coke is quite warm, and practically absolutely dry. Of course, for this service the Company charge the buyers an additional price. The operations in the house in which the screening, measuring, and sacking of the coke are performed were watched and examined with much interest. The coke is classified by its passage through a revolving screen; and the different grades fall directly through shoots into 2¾-bushel hand tips, from which the sacks are filled direct. Then by means of conveyors, it is despatched, in the sacks, either to railway waggons or to the coke heap. An interesting piece of mechanism is a mechanically operated lift, which is constantly working, and which raises sacks of coke to the height of the shoulders of the men who have to remove them and send them on their way to their different destinations. The conveyor for the sacked coke is constructed of a Dodge chain running on wheels; and those sacks of coke which are not immediately required are raised by an inclined elevator to the top of the coke heap, and there they are emptied by hand. The heap can be carried to a height of 22 yards. Aërial cables are also employed in the distribution of the coke to various points. At the foot of the heap is another machine for measuring and bagging the coke again when required; and it is capable of filling 400 sacks an hour. The bagging of the coke appears to be responsible for a good deal of hand labour at the different points of the system; but the whole of the work is accomplished with remarkable cleanness and despatch, which are matters worth consideration in a large works. By the Company's engineers, this installation of coke plant is regarded as an imposing feature of the works. It was designed by M. Louvel, the Constructing Engineer; and it is operated electrically. The washers are also driven electrically; and, benzol being used on the works for enrichment, the electrical plant is used for lighting various parts of the works at night. The time at the disposal of the visitors only permitted of a hasty survey of other portions of the plant. The purifying-houses occasioned some little astonishment, on account of the smallness of the boxes. There are four houses; each containing 32 vessels measuring about 15 ft. by 10 ft. Prepared oxide and sawdust only are used in the purifying process. Eight Pelouze and Audouin condensers were reported to work well, and give every satisfaction. They relieve the gas of all tar, and consequently keep the upper part of the purifiers clean in this respect. Another feature of interest was the system of passing the gas into the tops of the holders by means of mains with knuckle joints. The day pressure of the gas was stated to be 3½ inches, and the night nearly 5 inches. These are a few of the interesting points gathered during a walk through the works, made under most pleasant circumstances, and the guidance of the most courteous and distinguished of French gas engineers.

Meanwhile, the ladies, who had remained on board, had been taken to view a further stretch of the river, and were also entertained in one of the saloons with light refreshments in the most charming manner possible by the hosts for the day. On the gentlemen re-embarking, they were the happy recipients of similar civilities and favours. A little later during the passage, when all were on deck, there was a courteous exchange of compliments between the President and M. Troost, the Chairman of the Company, and M. Godot, the General Manager. Addressing these gentlemen, the President said: Gentlemen,—On behalf of the Gas Institute as a body, of the gentlemen who have come over here, and, I am asked to say also, on behalf of the ladies whom you have so hospitably treated, I have to thank you exceedingly for the way in which we have all been received. When the invitation came to us to visit one of your works, and we accepted that invitation, we did so thinking that we were simply going to view a works of one of the leading cities of the world, in the usual manner; that we should be received by the works manager, shown round the works, and be allowed to form our own conclusions; and that we should find our own way there and back. The way you have treated us, we know, is not because we are so many gentlemen, but because we represent the same industry as yourselves in a neighbouring country, and in a very friendly country too. (Cheers.) I must say, on behalf of all my friends and colleagues who have been here to-day, that we had no idea we should be received in so magnificent and princely a style as that in which we have been received. I can assure you, we greatly appreciate it; and I only trust that, sooner or later, it may be our privilege, either as a body or as individuals, to receive you over in England in a similar way. I can assure you that you will be received just as hospitably—just as warmly. I ought to add also, and I ought to have said it sooner, that we are indebted very much to you for the exceedingly kind way in which we have been shown round the Clichy works by MM. Euchène and his colleagues; and we appreciate it as professional brethren one to the other. We feel sure, whenever you may come over to England on a professional or friendly visit, you will always be shown what you want to see. We shall be only too glad to show you all we can, and perhaps [humorously added the President] on one or two points we may give you a little bit of advice. The sentiments conveyed in the President's words were very heartily received.

The tenor of M. Troost's response (which was uttered in French, with great vivacity and politeness of expression) was that the Paris Gas Company were very delighted to show the works at Clichy to their English colleagues. This station was the most complete of all the Company's works; and, as had been seen, there they had tried to economize labour in many ways—chiefly in respect of the methods employed for dealing with the coke. In the transport of the coal from the barges, they had also done all they could in the same direction. They had seen the derrick and the crane, driven by a gas-engine, raising the coal from the barges, and the manner in which it was transferred to the retort-houses. The Directors were glad to have had this opportunity for showing their regard to their English colleagues, as well as to the ladies; and he hoped one and all would have a long remembrance of their

hospitality and goodwill. Returning to the saloon, the President proposed the toast of "Health and long life to the Paris Gas Company. May it live long, and may we again be allowed to enjoy its hospitality at a later date." The toast was honoured by the visitors, and supplemented by three ringing cheers. M. Euchène then reciprocated with "Here's to the English gas engineers, and our English friends." The toast was drunk by the French gentlemen present with equal enthusiasm. With hearty handshakings, and mutual assurances of esteem, hosts and guests separated at a landing-stage almost immediately opposite the Exhibition Hotel, where the company were staying.

The next day was given up entirely to sight-seeing ; and many of the party saw something of the grandeur and marvels of Paris for the first time. Driven in vehicles supplied by Messrs. T. Cook and Sons, and accompanied by one of the most courteous and intelligent of guides, they visited or passed the new French Opera House, Madeleine Church, Place de la Concorde and Obelisk of Luxor, Palace of the Elysée, Champs Elysées, Arc de Triomphe de l'Étoile, Trocadéro Palace, École Militaire, Invalides and Tomb of Napoleon I., Ministry of Foreign Affairs,



TOMB OF WINSOR
IN THE CEMETERY OF PERE LACHAISE, PARIS.
From a Pencil Sketch made by Mr. W. J. TENNANT.

Palais Bourbon, Chambre des Députés, Pont de la Concorde, and the Palace of the Legion of Honour. Here a break was made for luncheon at the Palais Royal. Again boarding the brakes, they continued their tour, and visited the Palais de Justice, the Conciergerie, Sainte Chapelle, Notre Dame, Place de la République and Statue of the Républic, Place de la Bastille and Column of July, and the Prison de la Roquette. The last place visited was the Cemetery of Père Lachaise ; and there they had pointed out many of the tombs of the departed great. One of them, which had a peculiar interest for the members, was that of Winsor ; and very kindly one of the company (Mr. W. J. Tennant, Fel. C.I.P.A.) made on the spot the accompanying rough sketch of this monument to the memory of a man who was so intimately connected with the inception of our great industry. Inscriptions appear on the two front sides of the triangular column of the monument. One is reproduced on the sketch ; the other is in French, and runs : " Ici repose Winsor, Fondateur de l'Éclairage des Villes par le Gaz. Mort à Paris, le 11 Mai, 1830. Agé de 68 ans. L'application qu'il fit à Londres de cet éclairage en grand remonte à 1803, il l'importa à Paris en 1815, et de ces époques date la propagation de ce Systême.—Ex fumo dare lucem." The day being fine and refreshingly cool, the outing was immensely enjoyed.

The reception by M. Th. Vautier, the President of the Société Technique de l'Industrie du Gaz en France, and M. Eugène Lebon, the President of the Gas Section of the Exhibition, on Saturday, in the Gas Pavilion, was a decided success. It was really a grand *réunion*, in which gas engineers of France, Germany, England, and America mixed and fraternized, and also showed and expressed, individually and collectively, their great regard for each other. May that regard long continue ! The representatives of the Société Technique, of the Gas Institute, and of the German Association of Gas and Water Engineers, with friends and a few visitors from America, began to assemble about two o'clock. A little later they were invited to the reception-room, where M. Lebon presided—on his right hand being M. Th. Vautier and Herr Wunder (in the absence of the President of the German Association, Herr von Oechaelhaeuser), and on his left, Mr. E. H. Stevenson, the President of the Gas Institute.

The visitors having all assembled, M. Lebon briefly, but heartily, welcomed them ; remarking that he had the honour of doing this first because he was the oldest man on the platform. He then called upon M. Vautier to address the visitors.

Speaking in French, M. Vautier said: Gentlemen, and dear colleagues, I have the honour to wish you welcome in the name of the Société Technique de l'Industrie du Gaz and of the Organization Committee of the International Congress, 1900. We congratulate you that your visit to the Exhibition has permitted us to meet together and to exchange with you proofs of cordial fraternity. It is the desire to know better our foreign *confrères*, to show in common our works, and to exchange our views, that has prompted us to arrange in Paris for the commencement of September an international congress of the gas industry. We have the pleasure to announce that we have already received 1150 promises of attendance, of which at least one-half will come from foreign countries. The congress will last for several days—a fact which will permit us to make a better acquaintance with our *confrères*, and to receive them more completely than we have been able to do in the few hours at our disposal to-day. We are very pleased and very happy that most of you are coming to our Congress ; and we hope that, in any case, you will follow the proceedings with interest. I have now to indicate to you the organization of the visit we are going to make. We shall commence with the Gas Pavilion, where we are now gathered together, and which has been constructed, on the initiative of our Société Technique, with the help of the Paris Gas Company and of various other Gas Companies. It is M. Eugène Lebon who undertook its supervision and organization. I shall leave it to him to do the honours to you. We shall request you to divide yourselves into four groups, each of which will be conducted by one of our colleagues to and in the sections of the Exhibition connected with the industry. Permit me, in concluding, to give you the toast of " Prosperity to all the Foreign Technical Societies, and particularly of the Gas Institute and of the German Association of Gas and Water Engineers," of which you are the representatives. Gentlemen, I drink to the union and prosperity of your Societies.

M. Vautier also announced that he had received from Dr. Bunte a telegram thus worded: " We address to the Gas Engineers of France, of England, and of Germany, gathered together in Paris, our cordial greetings, and our best wishes for the continuance of friendly relations between colleagues, in order to promote the prosperity of the gas industry in the Twentieth Century." The message was received with loud applause, and M. Vautier proposed that the assembly thank Dr. Bunte, and address to him a unanimous concurrence in the sentiments he had expressed.

The honour of responding first fell to Mr. E. H. Stevenson, for the Gas Institute ; and this honour as the youngest President present, he sincerely appreciated. Proceeding, he remarked: I must say for the English gas engineers that we have felt throughout our visit here how very kind and hospitably we have

been received by our French colleagues. We were told that there was trouble between the French and the English in many ways. We have seen nothing of it; we certainly shall not see anything of it, I know. Why there should be any trouble, I do not know. We wish to be friends with France and with the inhabitants of France; and I think they want to be friends with us as well. It is to our mutual interest; and the way in which we have been received here proves that in every respect you desire our friendship. It is the first time I have been over to France in any official capacity; and I must say that the warm manner in which we have been received, not only here, but also on Thursday afternoon, Sir, is very greatly appreciated by us. We have been received and treated in the most handsome way; and we have enjoyed ourselves immensely. I do not believe there is one among us who is not surprised at what we have seen here; and the surprise has brought enjoyment with it. I do not think in our country we quite understand how to do these things, just in the same way that we poor Englishmen do not understand how to use our tongues in any other language but our own. It is our misfortune; it is our stupidity, probably. But we do not; and so we miss a very great deal which we should otherwise enjoy exceedingly. In so far as we have been able to understand, there is one thing that has impressed itself upon every member of the Gas Institute—that you, representing the French gas industry, welcome us, not as enemies, but as friends and *confrères*. We, in a similar manner, reciprocate your kindness; and we hope that we shall have the opportunity of doing so officially. At any rate, we can do so individually; and to me, for one, it would be a matter of very great happiness to have the opportunity. We thank you for your kindness and reception, and for all you have done to make our visit so happy. We wish France every prosperity.

Herr Wunder, in a speech which raised to great enthusiasm the German gentlemen present, expressed the pleasure which he felt at seeing the gas engineers of great nationalities fraternizing in the manner they were doing that day. He concluded by asking both the German ladies and gentlemen to give a hearty *hoch* three times—one for the Société Technique and the Paris Gas Company, for M. Vautier, and for M. Lebon. This they did with very great heartiness.

Refreshments of a luxurious character were then served; the hosts intermingling with their visitors, and showing them attentions in the most charming manner. Afterwards, the whole company were divided into four parties, and conducted round the Pavilion and to the different sections of the Exhibition which possessed the greatest interest for them as engineers. For the English party, M. G. Chamon was the kindly and courteous guide; and he addressed himself with the greatest possible interest to the pointing out of special objects, and to answering the thousand-and-one questions with which his inquisitive following plied him. About the gas exhibits, there is one thing to be regretted, and that is that they are not concentrated. What there are are good of their kind. But the variety is not great; and there is a very small representation from foreign sources. In the Gas Pavilion, the use of incandescent lighting for domestic purposes is finely demonstrated; and gas cooking and heating stoves and other household conveniences are also shown. In the centre of the main building is a splendid statue of Philippe Lebon. Various interesting manuscripts and books are also to be seen. The Pavilion has been so fully described recently, that there is no need to make further reference to it. In other parts of the Exhibition, but widely separated, are to be seen fittings used for old and new methods of lighting; in another quarter there is a small photometrical room, apparatus for the verification of gas-meters, a collection of meters, and some handsome street lanterns fitted with incandescent burners. Elsewhere may be found some good examples of the work of the Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, including a Pelouze and Audouin condenser, and extractors for benzol and cyanogen. Again some little distance away are to be seen exhibits of Messrs. Graham, Morton, and Co.'s inclined-retort system, and of the Berlin-Anhalt settings. The latter is a very interesting and complete model. In the Mechanical Electrical Section, a number of English gas-engines were noticed—the exhibitors being Messrs. Crossley, Tangyes, the National Gas-Engine Company, and the Dudridge Iron-Works.

If the gas exhibits are scanty, high and normal pressure gas lighting in the Exhibition and grounds more than compensates. In intensity, perfect diffusion, and effectiveness, it eclipses the electric light altogether; and, with the engineers who saw it on Saturday, we can say that it is the best piece of gas illumination on a large scale that we have ever seen. For giving such prominence to what can be done with gas, and in a way which must carry conviction to visitors from all parts of the globe, the Paris Gas Company have done a service to the gas industry in all countries; and they deserve the best thanks of all. We are glad to have had the opportunity of seeing this lighting and to publish our appreciation of it. In a pamphlet distributed among the visitors by the Paris Gas Company, it was remarked: The principal exhibit of the Company consists in the lighting of the parks of the Champ-de-Mars and the Trocadéro. The Company desire to put in evidence the progress realized in the lighting by gas, and to demonstrate that, in illuminating power and price, other systems of lighting are incomparable with this, even in the space so difficult to light as the gardens situated under the Eiffel Tower, 300 metres high. The Company have employed, for the lighting of the Champ-de-Mars, Auer mantles and Bandsept burners supplied to them by the Auer Society; and for the Trocadéro they have employed the "Model" Denayrouze burners, furnished to them by the Denayrouze Company. One part of the apparatus is supplied with gas compressed to 200 mm. This compression is obtained by means of compressors installed in the Pavilion of the Company on the Quai d'Orsay, near the Pont d'Iéna. The intensity of the lanterns varies from 22 to 360 carcels. The importance of this lighting is shown in the table below:—

—	Number of			Total Intensity. Carcels.
	Lamp-posts	Lanterns.	Burners (or mantles)	
Gas under normal pressure—				
Champ-de-Mars . . .	495	800	1,900	60,000
Trocadéro	455	610	1,400	
Gas under compression of 200 mm.—				
Champ-de-Mars . . .	140	240	1,200	40,000
Trocadéro	50	100	500	
Total . . .	1,140	1,750	5,000	100,000*

* Equal to 1,000,000 candles.

The total surface which is lighted up, not including the basements, is 200,000 square metres; and the daily consumption of gas is 1340 cubic metres. This does not exhaust by any means what the Company have accomplished at the Exhibition for the general benefit of the industry. The inspection over, the visitors returned to their hotels.

In the evening, the majority of the *voyageurs* left Paris by their chosen routes; and it is safe to say that not any of them felt a whit the less patriotic or loyal to their Sovereign than when they left the shores of England the previous Wednesday. But this they did feel—that their visit to the great city of our neighbours, and to the grand Exhibition on the banks of the Seine (the like of which Exhibition they had never seen before, nor in such collective form may never see again), had been an intellectual revelation to many of them. The short visit was sufficient to take them out of the narrowness of their every-day life. In the multitude of things they saw, there was much which impressed them—more, perhaps, than anything had ever done before—of the infinity of the workings and products of men's brains; and however great and marvellous the inventions of their own country had appeared to them, they learned that of such also were the inventions of other countries, and equally worthy of respect and admiration. With so much to ponder over and to talk about, they were richer than when they left home. And, moreover, the thorough kindness and good-fellowship which they met with from their professional compeers on the other side have knitted tighter their sympathies and bonds; and any little uncertainty which recent events may have engendered in the minds of some of the members has been cleared away by a closer contact than can be secured through the medium of the Press. Would that representatives of all industries common to both countries could be brought into personal communion in the same way; and a better understanding would ensue which would benefit both nations.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1657.)

THERE was hardly any improvement to be discerned in the general condition of business on the Stock Exchange last week. The persistent quietude which has settled down upon it ruled steadily all through the week. This was the more disappointing, as it was clear that there was abundance of money on the look out for good investment. The London County Council, Bristol, and Nottingham loans were eagerly taken up; and it is believed that the subscriptions exceeded twenty-five millions. But very little money came in the direction of Capel Court. This slackness naturally had a weakening effect; and prices for the most part are lower, though the shrinkage does not amount to much. The settlement was a light one, and was easily adjusted with the aid of cheap money. In the Money Market, the continuing and increasing ease brought about another reduction in the Bank rate; the Directors on Thursday lowering it to 3 per cent. from the 3½ per cent. at which it had been fixed on the 24th of May. Business in the Gas Market was not particularly active; and it was decidedly colourless and devoid of feature. By far the lion's share of transactions was done in Gaslight and Coke issues. Indeed, if they were eliminated, the total of business marked in all the rest would scarcely make up a moderate day's work. Their movements in value were almost conspicuous by their absence. If we except the alterations which proceeded from *ex div.* adjustment, the direct changes are reduced to two in number, and they are unimportant. In Gaslights, there was good, steady business in the ordinary all through the week at unswerving prices; stock changing hands every day at 101½, and occasionally touching 102½, while the quotation was advanced half-a-point. A moderate amount of business was done in the secured issues; but they did not move at all. Only three transactions were marked in South Metropolitan; but the price was firm and steady. Commercials were quieter still, and unchanged. Next to nothing was done in the Suburban and Provincial group; but a bargain was marked at a low figure in Brighton original, and the quotation dropped. The Continental division were extremely quiet, and what little was done in them did not point in the direction of increased strength. None of the rest presented any feature to record. In the Water Companies, there was rather more activity; and the tendency was in favour of higher prices, though there were not many actual changes effected.

The week's operations were so limited in their scope, and so monotonously level in point of price, that they do not call for daily notice, which would be mere repetition. Suffice it to say that on Tuesday Gaslight ordinary rose ½. In Water, New River rose 2, and East London 1½. On Thursday, New River rose 2 more. On Friday, Brighton and Hove original fell 2½; and Grand Junction Water rose 1.

ELECTRIC LIGHTING MEMORANDA.

The Analysis of Electricity Works Accounts—Unaccounted-for Electricity in London—The Costliness of Electricity in London—The Latest Electric Railway.

THE leading electrical journals show a praiseworthy solicitude for the establishment of a high standard of rectitude in the statement of electricity works accounts. The necessity of candid bookkeeping is not universally appreciated among those who are responsible for the administration of electric lighting undertakings; and therefore the electrical press, in insisting upon its observance, is performing one of the most elevated of the duties of specialized journalism. The current and previous issues of the "Electrician" contain some peculiarly instructive examples of analyzed electricity works accounts, including those of the Metropolitan Electric Supply Company, the St. Pancras Vestry, and the City of London Company. The first-named undertaking is one of the largest in existence. It has been the first among the London Electric Lighting Companies to feel the need for an extra-mural generating station supplying current on the scale which is commonly described by the term "in bulk;" and it experienced much trouble last winter through having taken on more lamp connections than it could satisfactorily serve. Our contemporary has now done so much of this analytical work upon electricity supply accounts, that it has arrived at the point of being able to criticize the results of its analyses in particular instances by average data ascertained from examination of the working results of the generality of undertakings of the same class or locality. This, of course, is the purpose of analyses of works accounts. Perhaps in a few years consulting electricians who advise local authorities to spend the money of ratepayers on electric lighting schemes will also use data of this kind for the bases of their estimates.

It is one thing to exercise the imagination upon presentments of what electricity supply ought to be done for, and quite another to correct these fancies by reference to accomplished facts. Many of the results ascertained by analyzing electricity works accounts never do find their way into preliminary estimates, although the supply of material is ample. On the other hand, scarcely two undertakings keep their accounts in such a way that all the critical data can be extracted from them in a strictly comparable way. As regards the working of the Metropolitan Company, the "Electrican" observes that the aggregate costs of production are at least 0·4d. per unit more than they should be. The same criticism is applied to the St. Pancras Vestry results, only more so, inasmuch as the costs here are stated to be 0·5d. per unit too high. Singularly enough, the latter is exactly the figure applied in a like sense to the City of London Company; so that we have the remarkable coincidence of these three big Metropolitan concerns all taking a halfpenny per unit too much to work their stations. This is a serious amount. The Metropolitan Company do not mind owning up to an output of 12,891,250 units, of which only 8,327,939 units are entered as sold. These analyses do not give the proportion of electricity unaccounted for, as is usual in gas-works statistics. Evidently this proportion would be a very large one. The City of London Company avoid any impeachment of their performance in this regard by omitting to give the number of units generated. The Metropolitan Company are shy in other respects. They do not state the total capacity of their plant, which omission knocks out numerous consequential figures from the "Electrician's" statistical table.

In discussing the St. Pancras Vestry undertaking, our contemporary expresses satisfaction at the appearance of indications of a resumption of progress towards more economical working, after a rather bad year. These Metropolitan electric lighting undertakings are mostly enjoying rates of increase of from 15 to 25 per cent. in the number of lamp connections. For this reason, they ought to be able to put their finances upon a sound basis; and some of the companies are profiting by the opportunity for doing so. The St. Pancras Vestry, however, are not making any provision for depreciation; but this is the same old story that has so often been told. The position of the City of London Company naturally exhibits the effects of the stress of circumstances. Yet, notwithstanding everything, the amount of business done has increased for the year by nearly 20 per cent. The dividend fell from 6 to 4 per cent.; the profits having been seriously diminished by the forced reduction in price. None of these Metropolitan undertakings accounts can be understood as indicating that the business of central station electric lighting even in London is a gold mine. The cost of the unit is not what can reasonably be characterized as low, considering the large scale of power generation and the excellent class of machinery employed in the work. Nor do the statistics encourage the hope that generation in bulk would materially modify matters in this regard. Cheap electricity for lighting is not yet in sight from these parts; and cheap electric power is still farther off.

Most of the London newspapers last week had special notices of the practical completion of the Central London Electric Railway. It does not appear to have been mentioned anywhere that there is considerable risk of confusion being made between the names Great Central Railway and the Central London Railway. Not for the first time, we have, in our national haphazard way of doing these things, permitted two utterly different and unconnected objects to be designated by very similar names; and consequently telegrams, letters, parcels, and passengers will occasionally be gloriously muddled up with the two. Although so short a time has elapsed between the making and equipping of the various Metropolitan underground electric railways, considerable differences appear between the successive realizations of the same idea. Electric railway practice has not yet become standardized. The newest plant for generating the current is on a very extensive scale; and the twin stocks of the Shepherd's Bush power station are already conspicuous landmarks of this region. The arrangements for distributing the driving current over the railway system are all novel. They include the use of rotary converters of the largest size ever made for railway work; and the most elaborate provisions exist to ensure the service against interruption. Still, we are left in ignorance of the margin allowed for wasted power; and therefore no fresh information is forthcoming as to the efficiency of the electric transmission and utilization of energy in the latest form of electric railway.

THE LAW OF LONDON GAS COMPANIES; AND FANCIES ABOUT SOME OF THEM.*

THIS is a curious little book. It strikes an amused, and occasionally amazed, reader as representing in its composition that fusion of the two limbs of the legal profession which has been so much and so long talked about; for one half of it is advocacy, and the rest is law. The author is a barrister, and he has a happy knack of writing blithely on so stodgy a matter as the general and statutory history of the gas supply of London. Thus, in his so-called Introduction, he leads his interested reader on until, before the innocent suspects his fate, he is in the thick of a Chartered brief against Mr. George Livesey! It will be the kindest service we can do Mr. Barnes to mention his law book first, and postpone further comment upon the facetious pamphlet of 39 pages with which he introduces it.

The serious part of the work—that which will alone give it any permanent value as a collection of the London Gas Acts

* A Synopsis of the Statutes, Public and Private, affecting the Metropolitan Gas Companies. With Comments and a Short History. By Thos. J. Barnes, of the Middle Temple, Barrister-at-Law. London: Walter King.

IMPORTANT NOTICE.

For the PROTECTION of WELSBACH AGENTS and the TRADE GENERALLY.

1.—MANTLES.

It is highly desirable that, in their own interests, the Agents of the Welsbach Company and the Trade generally should clearly understand that statements to the effect that the "Monopoly of the Welsbach Company came to an end with the expiration of the 1886 Patent"

ARE UNTRUE.

The present process, under which the Welsbach Mantles are made and which infringers imitate—described by the Court of Appeal as **"a remarkable and astonishing discovery of LATER TIMES,"** was first disclosed in the 1893 Patent, the **Welsbach Company's Patent Rights** in which

EXIST UNTIL 1907

and the Company will continue to uphold its rights, and to suppress all infringers of Mantles as well as of Burners.

In a circular dated 28th February last, the Sunlight Company states that the Welsbach Company "failed against their predecessors," the New Incandescent (Sunlight Patent) Company, Limited. The Judgment of Mr. Justice Buckley, of which the following is an extract, **will show how little truth there is in this statement:—**

> "In my opinion there has been an infringement of the Patent. . . . . I make the order therefore for an enquiry as to damages, and for delivery up . . . . and I therefore give the costs as between Solicitor and client."

It is also suggested that the Welsbach Company's action against the Sunlight Company for Infringement of the 1886 Patent has also failed, whereas the fact is that the Judge declined to **grant an interim injunction** on the ground that the duration of the (1886) Patent was so short. The Sunlight Company were ordered to keep an account, and the action for damages for Infringement against them will come on in due course. As the present Sunlight White Mantle is identical with that which Mr. Justice Buckley found to be an infringement, it will be seen that the Welsbach Company were entirely justified in the warnings they have given.

There is a further action pending against the Sunlight Company for infringement of the Welsbach Company's 1893 Patent, and it is claimed that the Sunlight Mantle is an even closer infringement of the 1893 Patent than of that of 1886, in which case it was held that the Defendants infringed "by using the material, namely, Thoria, suggested by the Patent of 1886." But for the delay resulting from the repeated applications of the Sunlight Company to the Court, this action on the 1893 Patent would have been settled before the expiration of the 1886 Patent.

The Welsbach Company is therefore still compelled to warn Dealers and the Public against BUYING, SELLING, or USING the SUNLIGHT WHITE MANTLE.

2.—BURNERS.

The Welsbach Company **repudiate absolutely** the statement that the New Welsbach Kern Burner is an infringement of the De Mare Patent, and the threats of the Sunlight Company should be ignored. At the time the Welsbach Company acquired the Kern Patent, they satisfied themselves that the Kern Burner did not infringe the De Mare Patent. The crude suggestions for a burner contained in De Mare's specification have been exhaustively tested by the Welsbach Company, and found useless.

The "Kern" Burner was brought out in 1897, and is unlike anything to be found in the De Mare Patent, **which makes no reference to a "chimneyless" burner.**

It cannot be too clearly understood that the New Welsbach "Kern" Burner embodies **absolutely new and original features** based upon a most interesting and valuable scientific discovery.

The Welsbach Company, convinced of their rights, have notified the Trade that they are prepared to defend any action which may be brought with respect to the "Kern" Burner, and to indemnify the persons attacked from all consequences.

The Welsbach Incandescent Gas-Light Company, Limited,

78, York Street, Westminster,

LONDON, S.W.

OVENDEN,

HALIFAX.

JONAS DRAKE & SON

Telegraphic Address: "DRAKESON HALIFAX."

Telephone No. 43, HALIFAX EXCHANGE.

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FURNACE FITTINGS AND RETORT MOUNTINGS.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W.

before the present year—fills 63 pages. It begins by setting out the names of the three London Companies, with the titles of their Acts. The statutory history of the Commercial Company, being the simplest, is related first. Then comes the South Metropolitan record, which gives the author a little more trouble. He takes considerable pains to set out the true capital account of this Company, which is admittedly a complex matter. In stating the capital powers and conditions of the Gaslight and Coke Company, the author makes out that there is an amount of £1,088,694 available to meet capital demands, with the addition of whatever premiums may be obtained on the sale of the remaining £250,000 of ordinary stock, and of the remaining £200,000 of 3 per cent. consolidated debenture stock. Against this (at the end of last year) there was a temporary loan of £125,000. There is nothing to be said by way of comment on the author's collection of the statutory requirements applying to the ordinary work of the Companies. His method is to take a specific matter, such as "streets," for example, and state the general, public, and private enactments applying to the subject, with brief explanatory remarks and the rules laid down in leading cases. This plan is more informing to the student than complimentary to the system of gas legislation, which is exhibited as a thing of shreds and patches, there being differences of statutory powers among the three Companies on very many points. Mr. Barnes appears to be careful to verify his references; but he has omitted to insert the date of the abandonment of the supply of cannel gas by the Chartered Company.

It is difficult to test the instructional value of a book of this kind without reference to some particular question. It has been reported that the Portable Photometer Bill of this session, promoted by the London County Council for the purpose of making the London Gas Companies liable to surprise and peripatetic penalty testing for illuminating power, has been pronounced superfluous by the Law Officers of the Crown, who are of opinion that the Gas Referees already possess the very power which this Bill would have conferred upon them. We cannot vouch for the accuracy of the report, and, of course, have no intention of discussing its substance as a pure hypothesis. But one suggestion will serve as well as another for testing Mr. Barnes in his capacity as a guide to the statute law of this matter. All that can be gathered from him on this head is the information that the Referees "shall prescribe and certify the mode of testing and recording the power and purity, the situation of the places for testing, and the apparatus and materials therein." It may be a nice question whether such a direction is broad enough to cover the scheme contemplated in the Portable Photometer Bill, or anything like it. But an affirmative answer to the query would seem to be barred by the wording of ancillary provisions, which refer to testing-places in terms that imply "a local habitation and a name" in this connection.

It will be understood that we have no criticism to offer on that part of Mr. Barnes's book which is a synopsis of the London gas statutes, public and private. So far as this goes, it is a useful guide to the Acts themselves, and gives many good hints as to how their various and anything but uniform provisions may be studied. As the author only puts forward his compilation as a section of a more comprehensive work which he is keeping back to see what Parliament means to do this session, it would be unfair to criticize the little book for what it is not. The question that naturally arises is whether the whole thing had not better have been kept back; and this probably would have been the wiser course. There is no valid reason why the book should have been rushed out while the South Metropolitan Bill is in course of passing through the Houses, more especially as the Act, if it passes, will render the book partially obsolete. And can there be anything more hopelessly obsolete than a law book which is out of date?

But the reason which may have induced Mr. Barnes to get out his booklet in the middle of the session is perhaps to be found in what we have styled the pamphlet part of it, which the author prefers to call his "Introduction." This is a bright and brisk piece of writing, which amply fulfils the first purpose of an introduction, by introducing the reader to the foundation of the main portion of the work. For a certain distance, students of statutory and of technical origins must travel over the same ground. For this reason it is quite correct for Mr. Barnes, barrister-at-law, to introduce his readers to Winsor and Murdoch. But it is an unhappy weakness in specialists to forget their speciality; and Mr. Barnes is as bad in this respect as many engineers who will talk law, and many chemists who have a fondness for social science. Thus he relates that the Gaslight and Coke Company "obtained an Act in 1810," without telling why or wherefore. Yet this was his proper business as a lawyer. Why did the Company want an Act of Parliament? Mr. Barnes goes out of his way to record the fact that "Science, though less unfriendly than Commerce, had chill misgivings" about the proceedings of the first incorporated Gas Company. But the attitude of science, or commerce, is no concern of his, as a barrister-at-law. What was the legal position, and why should an English Gas Company need an Act of Parliament, which is not wanted by an American or Continental gas company?

An adequate answer to this natural question would have served nicely to introduce us to the statutory aspect of the gas supply of London; but this Mr. Barnes does not provide. Surely, he is not ignorant of the circumstance that many scores, even hundreds of gas undertakings still exist in the United Kingdom without statutory privileges, protection, or obligations at all? He would have worked a much fresher vein if he had expounded as fully as possible what may be called the natural history of gas legislation, which is a great mystery to Continental and American gas specialists. How is it that we have nothing like the Continental "concession," or the American "franchise"? These are legal and constitutional queries, which a barrister might be expected to know something about.

In justice to our author, we must admit that he occasionally drops into law, as Silas Wegg did into poetry. For example, he discusses the Clauses Consolidation Acts in an informing manner, showing how much needless trouble, uncertainty, and expense may be caused both by the similarity and the difference of what should be common clauses. But after a few pages of explanation as to General and Special Gas Acts, Mr. Barnes grows tired of studying comparative gas legislation, and fastens joyfully upon the "somewhat peculiar" position of the South Metropolitan Company under their latest and previous Acts. This is on the eighteenth page of his pamphlet, and throughout the remaining eighteen pages he enjoys himself hugely at the expense of the Company's doubtfully-worded Acts, their cloudy accounts, and the vagaries of the Chairman, Mr. George Livesey. This is not exactly what one is prepared to find in a law book. But it is very fair journalism; and inasmuch as it would be likely to rest unseen in the decent obscurity of an "Introduction" to a study of statute law unless we disinterred it, we make no excuses for dragging it to light before it goes wholly out of date. Mr. Barnes is laudably desirous of having the South Metropolitan accounts straightened out, so as to show what the amounts are on which dividend and interest are paid. Singularly enough, the Chairman of the Company has anticipated Mr. Barnes in this desire; and the object will be attained by the Company's Bill of this year. Why, then, should Mr. Barnes complain of the "anagogic utterance"—whatever this means—of Mr. Livesey in anticipating his criticism of the old statutory form of accounts?

Nobody except the author will be interested in the various exercises he indulges in to prove how admirably he could have kept the Company's books, if he had been their Accountant. This, again, is not law writing. It serves, however, for a stick wherewith to chastise Mr. Livesey for having indulged in "an arrogant, unkempt criticism" on "the administration and administrators of a neighbour Company." So there we are at last! Mr. Barnes takes his seat in his chosen galley, and thenceforward tugs at the labouring oar to make it go safely through the deep waters in which the report of the Powers of Charge Committee left it wallowing. He does not make her go very lightly. He exaggerates the effect of the old London amalgamation "entanglement," on the price of gas north of the Thames, as to which, he says: "The Gaslight Company cannot, *for admitted reasons*, sell gas as cheaply as the South Metropolitan can." Where are these reasons, and who has "admitted" them? This is pretty fair for a writer who elsewhere remarks that "this little book must be kept free from all controversy." Why, this Introduction, or the better part of it, is nothing if not controversial! Take the following observations: "No blow aimed at the gas interest from the outside has done it such permanent injury as that struck from the inside, at the management of a particular Company" . . . . "the agitation triumphantly flourished against price yesterday, to-morrow will direct itself against profits." . . . . "Belgravia and Piccadilly pay for most things more than is paid in the distant settlements of Peckham and the Old Kent Road." This, as we have already admitted, is all very amusing; but it is not judicial, nor judicious. Mr. Barnes lays himself open to retorts so obvious that it were superfluous to give them; but if he imagines that Londoners and the Legislature will ever be pacified while there is a difference of a shilling per 1000 cubic feet, or thereabouts, between the prices of gas in Clapham and in Kentish Town, he is grievously mistaken. His attack on Mr. Livesey is instigated by the circumstance that Mr. Livesey alone, seeing how things were going, exercised his legal rights as a shareholder of the Gaslight and Coke Company and said some unpalatable things of the administration.

If Mr. Barnes were a true friend of the Gaslight and Coke Company, he would apply his talents and his interest in some more helpful manner than in the forging of cheap sneers against those critics of the Company's administration who are only too safely on the laughing side, if that were any satisfaction. "So far-reaching are his (the consumer's) interests that one Company, when he is not their customer, may feel moved in their generous sympathy to urge that the alien company who light his house should forego their profit for his further good." This is Mr. Barnes's idea of the correct style of treating—without controversy—the actual situation. He can hardly think that it will help his chosen side to get a penny of fresh capital from Parliament, or will reconcile a single northern gas consumer, or even inflict a passing pang upon that dreadfully unkind person, the Chairman of the South Metropolitan Gas Company. What, then, is the good of it? And why put it into a law book? These be mysteries, indeed; but unhappily the painful facts remain, one of which is the loss of the Chartered Bill while Mr. Barnes's book was passing through the press. This single circumstance unhinges a good deal of his arguments. In any case, he will scarcely reprint his pamphlet as the introduction to his promised larger volume.

THE ORIGIN AND POTENTIALITY OF COAL.

It would probably be unjust to say that, as a rule, gas managers do not trouble themselves much about the origin in a remote age of the raw material with which they have to deal; but we think it will not be denied that during the past eight months their thoughts have been directed rather to the pits which would be most likely to furnish their supplies than to the geological changes which produced the much-needed mineral. Further, their business from day to day has been directed to getting as much gas as possible from it; and the necessity has not arisen for very serious consideration of the general question of the potentiality of coal. Our stores have been freely drawn upon, and their product used in many cases with a recklessness betokening indifference to the eventuality of the supplies becoming some day exhausted. The recent very serious advance in the price of coal, taken in conjunction with the development of the branches of industry for which coal supplies the motive power, invests with more than ordinary importance the question of the rational utilization of its stored-up energy. It was doubtless with the view of directing serious attention to this subject that M. Gaston Kern, the Manager of the Strasburg Gas-Works, lately brought it under the notice of the members of the Société des Sciences, Agriculture et Arts de la Basse-Alsace, and appealed subsequently to a larger auditory by circulating his communication in pamphlet form, a copy of which has been forwarded to us.*

In his introductory remarks the author reminds his readers that the extraction of coal from the bowels of the earth requires much concentration of effort; and he says the fact has been too long ignored that coal can be much more economically employed as a fuel by previous gasification—a process which is applicable to every variety of coal, and is equally suitable for the production of motive power, heat, and light. He explains that it is his purpose to look generally at the problem as it now presents itself. What, he asks, has the future in store for us? In what form shall we burn coal a hundred years hence? Will sluggish Europe imitate go-ahead America? Shall we some day see rivalry between the old-fashioned works for making illuminating gas to which we are accustomed, and the modern plant for the production of "poor"—or should we not call it "new"—gas? M. Kern emphasizes the fact, which has lately been brought so prominently to the notice of gas engineers, that the invention of the Auer burner has completely revolutionized the gas industry. Before Dr. Auer von Welsbach appeared, he remarks, "rich" gas was necessary for lighting purposes. Now, however, illuminating gas is no longer indispensable, inasmuch as the Auer burner requires only gas which possesses calorific properties. Heating gas is power gas—the gas to which the generic name of "poor" has been given; and, moreover, it is cheap, and serviceable all round. In its production, no costly "fat" coal is required. It may be made with any kind, or even with peat; and the process does not yield residuals, such as coke and tar, the possession of which, according to M. Kern, only causes people to continue their wasteful use of solid fuel. He thinks that a gas which can be economically used instead of steam and as a substitute for heating by coke, coal, or wood, has assuredly a great future before it, and will be the medium by which the balance between the production of coal and the growing needs of its consumers will be re-established.

With this introduction, M. Kern proceeds with the subject-matter of his book, which is divided into two parts—the origin of coal, and the development of its potentiality. He tells us that a hundred years ago no reliable data existed as to the origin of what are familiarly known as "black diamonds," and much less as to the carbon forming their principal constituent. It has been left to the nineteenth century to furnish these particulars. The author deals concisely with the genealogy and morphology of coal, and with the geology and climatology of the carboniferous period; and he gives a plate representing an antediluvian carboniferous forest, with the gigantic lepidodendron in the foreground. He next considers the hypotheses brought forward to account for the covering up of this mass of vegetation, and explains the chemical action by which it is converted into coal. Having traced its origin so far, he proceeds to classify the different varieties, and to indicate on a map the coal basins of Central Europe and the number of persons engaged in mining. The production and employment of coal are next dealt with; but the statistics are not the latest obtainable—the different uses to which coal is put in England being for 1887, and the stocks in different countries being for 1890. The writer favours 500 or 600 years as the probable duration of the coalfields; but he consoles us with the assurance that the unused force of Niagara would be sufficient to replace the actual production of the mines.

In the second part of his book, the author deals with the development of the potential energy of coal. He considers first its utilization by means of the steam-boiler, and next by recuperative furnaces, by gasification, and by distillation. With regard to boilers, he shows that in practice the yield is only 54 per cent. of what theory says it should be; and he quotes the experiments of Messrs. Bryan Donkin and Kennedy, made with a number of boilers of different types, in support of this figure. Moreover, the steam-engine utilizes only a small proportion of the heat conveyed to it from the boiler. Passing on to deal with recuperative furnaces, M. Kern remarks that theoretically they do not furnish a larger number of calories than ordinary grate furnaces; but, in practice, a temperature of 2200° C. is obtained with generators, while simple furnaces rarely furnish more than 1600°. An interesting chapter follows on the treatment of coal for producing Dowson, Mond, coke-oven, blast-furnace, and water gas; and the author gives a table (after Pfeifer) showing the comparative values of these heating gases—the highest duty being assigned to Dowson gas (89 per cent.), mixed generator and water gas coming next with 84·4 per cent., and illuminating gas figuring at 20 per cent. We next come to the distillation of coal in gas-works. The author shows that the distillation of 100 kilos. of coal will produce 30 cubic metres of gas, 70 kilos. of coke, and 5 kilos. of tar—the whole having a heating value of some 704,000 calories, as compared with the 750,000 calories of the coal. We therefore get 90 per cent. of the original calorific power of the coal after its distillation. In practice, however, from 10 to 20 kilos. of coke have to be deducted for the heating of the ovens; but, on the other hand, the value of the non-combustible residual products have to be added to the balance-sheet. As a matter of fact, therefore, the 30 cubic metres of gas are produced at the cost of 50 kilos. of coal. Given good gas-engines, consuming at the outside 500 litres (17½ cubic feet) per horse power per hour, the author shows that a horse power could be produced at gas-works with the consumption of 0·83 kilo. (1¾ lbs.) of coal—a result attained by only the most improved steam-engines.

In his concluding remarks, M. Kern points out that 100 kilos. of coal occupy in bulk only 0·15 cubic metre, which furnishes by distillation 30 cubic metres of gas, or 200 times the original volume of the coal. Furthermore, the 70 kilos. of coke form a mass 0·2 cubic metre in bulk, which by the Dowson process, for example, could be transformed into 300 cubic metres of mixed gas, equivalent to 1500 times the original volume of the coke. It is clear, therefore, that the admixture of air necessary to support combustion is more easily effected in the case of a combustible thus expanded than it is in that of a compact fuel such as coal. In the production of this gas with the minimum of thermic loss and the maximum economy of fuel, and in its complete combustion with the exact quantity of oxygen necessary for the operation, lies the whole secret of economic heating. The figures obtained up to the present time, however, show that the art of transforming into useful work the energy stored up in coal is still in its infancy. The steam-engine, notwithstanding all the improvements which have been made in it, utilizes only one-tenth of the latent force contained in the fuel, and the gas-engine only about one-fifth; whereas acetylene has stored up in it 2700 calories, and, according to Pictet, produces by its combustion about 4800° C.—a temperature which is unique in the history of chemistry—the author thinks that probably some day we shall obtain this result from carbonate of lime, which, like coal, owes its existence to the carbonic acid of the atmosphere, and forms mountains which are much less likely to be exhausted than coal mines. But whether it is a question of the carbon in the lime or that in the coal, there is this certain fact about them—that they were both stored up thousands of centuries ago, and that we give them back to the atmosphere after having utilized them in a more or less satisfactory manner.

It only remains to say that the text of M. Kern's book is illustrated by several diagrams, as well as by 28 plates showing various kinds of plant, including that employed in the manufacture of blast-furnace, producer, coal, and water gas; the system selected for the latter being that of Messrs. Humphreys and Glasgow. The book is a useful addition to the literature of a subject of special importance at the present time.

* "Le Potentiel de la Houille et ses Origines." Par Gaston Kern, Ingénieur, Directeur de l'Usine à Gaz de Strasbourg. Strasbourg: Imprimerie Alsacienne; 1900.

THE WATER SUPPLY OF LIVERPOOL.

The Water Engineer to the Corporation of Liverpool (Mr. J. Parry, M.Inst.C.E) has just issued, in accordance with the instructions of the Water Committee, an elaborate report on the undertaking which is subject to his supervision. It is divided into two parts—the first being historical and descriptive, while the second deals with the present state of the works.

It appears that in the early days of the city's history the only sources of water supply were shallow wells bored into the new red sandstone. As the population increased, carts were employed for the distribution of the water; and at the close of the eighteenth century there were 60 of them in use, distributing about 100,000 gallons a day. The first Water Act was passed in 1709; its object being to enable the Corporation to grant to Sir Cleave Moore, Bart., "liberty to bring fresh water into the town, and serve the inhabitants therewith from springs in the village of Bootle-cum-Linacre." The powers thus obtained were, however, allowed to remain dormant for nearly a century. In the year 1786, an Act was passed for, among other objects, "supplying the town of Liverpool with fresh and wholesome water." A sum of £95,324 was subscribed, and works were commenced in 1799 by sinking wells and laying pipes. In that year, a Company was formed under the title of "The Company of Proprietors of the Liverpool Water-Works," for "better supplying the town and port of Liverpool with water from

certain streams in the parish of Bootle." In 1822, an Act was passed to repeal the provisions of the Act of 1786, and to incorporate a Company, subsequently known as the Liverpool and Harrington Company, to take over the powers thereby conferred, and to construct works for the supply of the town and port with water. Thus competition was introduced, which, as in many other cases, resulted in an arrangement being come to for the two Companies to confine their operations within certain specified limits.

The supply furnished by the above-named Companies being inadequate, an agitation for a better service was commenced; and three Engineers—Mr. Hawksley, Mr. Cubitt, and Mr. Rendall—were engaged to investigate and report upon the various schemes proposed. Eventually, Mr. Hawksley prepared what was afterwards known as the Rivington Pike scheme, for impounding the upper waters of the Douglas and Roddlesworth, in Lancashire. This was adopted by the Town Council; and in 1847 the Corporation obtained an Act of Parliament (10 and 11 Vict., cap. 261) by which they were empowered to carry out the Rivington works and to purchase by arbitration the undertakings of the two Companies. Mr. George Stephenson was appointed Arbitrator; and he awarded them £537,392. After the passing of the Act of 1847, the advocates of wells in the new red sandstone continued the strenuous opposition they had previously raised to the Rivington scheme. Public feeling was greatly excited on this subject; and at length, on Nov. 9, 1849, all the questions at issue were referred by the Council to Mr. Robert Stephenson, who reported in March, 1850, in favour of proceeding with the Rivington works and adversely to the new red sandstone as a sufficient and permanent source of supply. The construction of the Rivington reservoirs was commenced in 1852, and the water was first delivered into Liverpool in 1857. The works have been extended from time to time to meet the requirements of the city.

Towards the end of 1876, the attention of the Water Committee was called to the advantages of the River Vyrnwy, in Montgomeryshire, as a source of water supply for Liverpool; and Mr. G. F. Deacon, who was then the Borough and Water Engineer, was instructed to report upon the subject, and also as to a proposal to procure a supply from Lake Haweswater. The conclusion at which Mr. Deacon arrived was that a reservoir to be constructed upon a particular portion of the Vyrnwy possessed all the more important advantages of the lake scheme, together with some which were wanting in the latter. The Vyrnwy scheme met with the favourable opinion of Mr. Bateman and Mr. Hawksley, and it was finally adopted by the Water Committee on June 4, 1879, and by the Council on the 29th of the following month. The Act of Parliament conferring the necessary powers for carrying out the project was passed on Aug. 6, 1880 (43 and 44 Vict., cap. 143); and the works were commenced in 1881. Mr. Hawksley and Mr. Deacon were appointed Engineers; but the former relinquished the position on Sept. 1, 1886, and the scheme was completed under the sole direction of Mr. Deacon. The works were formally opened by H.R.H. the Duke of Connaught on July 14, 1892.

In addition to the sources of supply mentioned above, Liverpool has three wells: The Windsor well, sunk in 1846, with a daily yield of 1,260,000 gallons; the Green Lane well, with a yield of 2,750,000 gallons; and the Dudlow Lane well, with a yield of 1,207,000 gallons. Geologically, the wells are all in the pebble beds of the new red sandstone formation. The Rivington watershed comprises about 10,000 acres of thinly-populated hill and moorland on the millstone grit. There are seven reservoirs, besides filter-beds; and they will hold 4105 million gallons of water. The Rivington aqueduct works comprise five reservoirs, which contain when full 103½ million gallons. The total area of the gathering-ground from which the Corporation can impound water at Vyrnwy is 22,742 acres. This includes two streams, the Cowny and the Marchnant, tributaries of the Vyrnwy, which have not yet been utilized. To convey the waters of the former into Lake Vyrnwy, a tunnel 5 feet in diameter is now being driven. The length of the conduit will be 2272 yards; and a similar tunnel 2442 yards long will be required in the case of the Marchnant. The area of the lake is 1121 acres; its length, 4¾ miles; and its available contents amount to 12,131 million gallons. The dam across the valley is 1172 feet long, 84 feet high, and 127 feet thick at the base; and its foundations are 60 feet below the natural surface. Its total weight in solid masonry is 510,000 tons; and the amount of excavation for the foundations was 220,890 cubic feet. The total length of the aqueduct is 67 miles. It consists of a tunnel 4⅛ miles in length to convey 40 million gallons of water per day, and pipes for 63¾ miles for the first instalment of 13⅓ million gallons. The quantity of water now delivered through the Vyrnwy pipes into Prescot from Oswestry is at the rate of 15,400,000 gallons daily. With regard to the quality of the supply, the monthly analyses show that the Vyrnwy water taken at Prescot contains 38 bacteria per cubic centimetre; the Rivington water, 34; the Dudlow Lane well water, 48; the Green Lane well water, 95; and the Windsor well water, 57. Professor Boyce, who makes systematic bacteriological examinations of the water, describes the result of his observations as most satisfactory; and shows that of five great Continental cities Liverpool is much below all except one (Munich) in the bacteria per cubic centimetre. Liverpool averages 24, against 50 for Berlin, 70 for Hamburg, 100 for Buda-Pesth, and no less than 1125 for Paris.

The total quantity of water distributed from the Liverpool works during the past year was 9,900,306,000 gallons, or an average of 27,199,000 gallons daily. It was obtained from the different sources of supply in the following proportions: Wells, 1,190,863,000 gallons; Rivington, 3,821,281,000 gallons; Vyrnwy, 4,773,530,000 gallons; sea, 114,632,000 gallons. The average daily consumption within the compulsory limit was 25.522,000 gallons, which works out to 31·154 gallons per day per head of the population. In 1846, it was 8·24 gallons; and in 1851, 10·75 gallons. The average consumption of water for the extinction of fires represents very inadequately the occasional demands for this service. At the largest fire which occurred in Liverpool last year, the quantity of water used was 1,750,000 gallons. Particulars are given of the measures adopted to prevent waste by the introduction of the Deacon meter. The capital expenditure on the Liverpool Water-Works to the end of 1899, including £2,203,855 on the Vyrnwy works, was £4,985.501.

The remainder of Mr. Parry's interesting book, which is exceedingly well printed, and is illustrated by reproductions of photographs, diagrams, and maps—raising it far above the category of an ordinary report—is devoted to observations on the present state of the works.

OBITUARY.

We regret to learn of the death of Mr. Adolphus F. Waller, who was for many years Manager and Secretary of the Sherborne Gas Company, and subsequently Sub-Manager of the Croydon Gas-Works. Deceased was a pupil of the late Mr. Bellows, the first Engineer of the Oriental Gas Company. He died on the 8th inst., at the age of 78, after a long illness, and was buried in Tooting Cemetery on the 13th inst.

PERSONAL.

Mr. W. Lister has been appointed Manager of the Aberavon Gas-Works, in succession to Mr. W. G. Owen.

Mr. C. Sheppard has been elected Chairman of the Battle Gas Company, in succession to Mr. J. P. Woolgar, resigned.

Mr. W. Pooles, the Mayor of Boston (Lincs.), has been elected Chairman of the Boston Gas Company, in succession to the late Mr. S. Sherwin.

Mr. R. M. Couper, formerly Manager of the Newbury Corporation Gas-Works, has been appointed to a similar position under the Brentwood Gas Company.

Mr. David Easson, of Maybole, has been appointed Manager of the Selkirk Gas Company, in succession to Mr. W. B. M'Lusky, who is going to Perth. Mr. Easson was for seventeen years in the Perth Gas-Works, rising to the position of Assistant-Manager. In that capacity he showed much ability, and his friends were greatly disappointed that his services could not be retained in Perth. Three years ago Mr. Easson was appointed Manager of the Maybole Gas Company. The output of gas at Selkirk is about three times that at Maybole; and so the change is an upward one for Mr. Easson.

Last Friday, an interesting ceremony took place in the stokers room at the Smethwick Gas-Works, when the employees of the Gas Department of the Corporation presented Mr. B. W. Smith, the Manager, who, as already announced, has obtained the appointment of Gas Engineer to the Walsall Corporation, with a handsome marble timepiece, bearing a suitable inscription. Mr. Bullock made the presentation, and referred to the pleasant relations existing between the employees and Mr. Smith during the latter's nineteen years' connection with the works. Mr. Smith suitably acknowledged the gift. His successor (Mr. Vincent Hughes) took up his duties on Saturday.

We regret to learn that Mr. W. J. Fuller, Engineer and Manager of the Bournemouth Gas and Water Company, has been compelled to resign his position on account of ill-health, and Mr. Harold W. Woodall has been appointed his successor. Mr. Woodall finished his education under Professor Beare and Dr. James Fleming at University College, was a pupil in the shops of Messrs. Bryan Donkin and Co., and was for four years Assistant-Engineer to the Westminster and City of London Electric Light Companies. For twelve months he was Assistant to Mr. G. F. L. Foulger, the Distributing Engineer of the Gas-light and Coke Company; and he has since been in the service of the South Metropolitan Gas Company under Mr. C. C. Carpenter—first at Vauxhall, and latterly in charge of the Old Kent Road station. Mr. Fuller is leaving the Bournemouth Company with the entire sympathy and good wishes of the Board, who have granted him a retiring allowance.

Coal in the United States.—The production of coal in the United States last year was 258,539,650 tons, as compared with 219,974,667 tons in 1898—being an increase of 38,564,983 tons. The largest coal-producing States in the American Union are Alabama, Illinois, Ohio, Pennsylvania, and West Virginia. The output of Alabama in 1899 was 7,234,758 tons, as compared with 6,535,283 tons in 1898; of Illinois, 23.435,445 tons, as compared with 18,599,299 tons; of Ohio, 16,679,880 tons, as compared with 14,516,867 tons; of Pennsylvania, 75,591,554 tons, as compared with 65,165,133 tons; and of West Virginia, 11,755,222 tons, as compared with 16,700,999 tons.

NOTES.

A Cyanogen Gas Identical with Argon.

Dr. T. L. Phipson, in the "Chemical News," points out that when dry cyanogen is passed into a glass tube heated to redness, and full of iron nails (*points de Paris*), devoid of rust, a gas is obtained which can be collected over water, in which it is only slightly soluble. This gas is colourless, and almost odourless; it extinguishes a lighted match without taking fire itself; it is not absorbed by potash; and when mixed with oxygen and submitted to the electric spark, it does not detonate. A quantity measuring 1000 c.c. weighed in two experiments 1·8 and 1·81 grammes at 0° C. and 30 inches barometrical pressure. These weighings were made with the best balance in Dr. Phipson's laboratory. The gas, therefore, was not nitrogen (of which 1000 c.c. in the same circumstances weigh 1·267 grammes), nor, *à fortiori*, cyanogen. It therefore contained carbon, and from these two determinations its atomic weight, or equivalent, would have the half of the quantity of carbon contained in cyanogen. Dr. Phipson thought it was perhaps identical with argon, of which about 1 per cent. had been found in atmospheric air, and which would therefore be a carbide of nitrogen, containing half the carbon contained in cyanogen.

Large Gas-Engines for Blast-Furnace Work.

Mr. Adolphe Greiner has reported to the Iron and Steel Institute on the results obtained at the Cockerill Works with the first blowing engine worked by blast-furnace gas ever employed in any iron-works (see *ante*, p. 1359). The problem, which is of great economic interest, has been completely solved by the engineers of the works, with the engine made by Delamare-Debouteville. This is a 600-horse power engine; and it has now been running continuously since Nov. 20, 1899, with unpurified gas taken from the Seraing blast-furnaces. The performance of this pioneer plant has been exhaustively tested by Professor Hubert, of the Liège School of Mines, in the presence of Mr. Bryan Donkin and other witnesses. On March 20 the engine was tested simply as a gas-motor, when it was found to be giving a mean of 575 brake horse power. The calorific power of the gas used, tested by the Junkers calorimeter, varied between 798 and 937, or a mean of 860 calories per cubic metre. The consumption of this gas per effective horse power was after the rate of 111·4 cubic feet. The thermal efficiency, or ratio between the power developed and the mechanical equivalent of the heat of the fuel consumed, was about 30 per cent. About 50 per cent. more was accounted for by the cylinder water-jacket; and the remaining 20 per cent. went off in the exhaust gases. This efficiency is highly remarkable; and the Seraing blowing engine marks an era in the construction of gas-motors. Several engines of 1200-horse power are in process of building for various Continental iron-works. Not the least interesting consequence of the success of these blast-furnace gas-engines is the possibility of establishing iron-works in localities where the large water supply necessary for steam-power plant does not exist. Thus blast-furnaces have been erected at Toula, near Moscow, and on the island of Elba—water being absent in both cases. The Crossley Company are working successfully in the same direction.

Some Points of a Contractor's Business.

A highly instructive paper on working methods of carrying out engineering structures was contributed during the last session of the Glasgow Association of Students of the Institution of Civil Engineers by Mr. James Brand. The paper was a valuable compendium of information upon most of the practical considerations that enter into the calculations of engineering contractors' agents. It tells the student much that it behoves him to know about excavations, timbering, rock cutting, blasting, pumping, and so forth. After passing in review old and modern practices in these all-important matters, Mr. Brand observed that the doubling of the rates of wages of the work-people employed in this line of business during the last 40 years might, on the face of it, be supposed to entail a corresponding increase of the cost of works. But this is not, in point of fact, the result. The improvement of appliances and in modes of working have practically kept the cost of earthwork—whether in hard ground or in soft—at very little advance upon the prices of that period. No doubt, said Mr. Brand, in light cuttings in sand or in gravel with short leads, prices were rather better than at present; but they were never below 7d. or 8d. per cubic yard. On the other hand, where there were long leads or soft material, the prices were never under 1s., and often a good deal more. Rock was never under 2s. 6d. for the lightest and easiest qualities; and it frequently went up to 5s. These prices are pretty much the same still; and the extra cost of wages has been met by the improvement in drills and the introduction of the more powerful explosives. Masonry under the same conditions certainly costs more; but although the wages have likewise doubled, Mr. Brand does not consider the prices for dressing and building greater than 30 to 50 per cent. above those obtainable 40 years ago. In concluding his paper, the author laid stress upon the desirability of encouraging people in very subordinate positions to communicate their ideas concerning possible improvements in the working to those in more authority.

TECHNICAL RECORD.

ASSOCIATION OF GERMAN GAS AND WATER ENGINEERS.

Inaugural Address of Herr W. von Oechelhaeuser.

The following is a translation (somewhat summarized towards its close, where it dealt chiefly with affairs of purely German interest) of the Inaugural Address delivered by Herr W. von Oechelhaeuser, the General Manager of the German Continental Gas Company, at the meeting of the above-named Association at Mayence on the 9th inst.:—

The President of an Association, in inaugurating its annual meeting with a retrospect of the progress of that industry with which the Association is concerned during the preceding year, is nowadays confronted with the dilemma which is often presented to the promoters of art exhibitions. In spite of the immense number of pictures from which these gentlemen have to make a selection, they cannot every year offer to the pampered public works which will live in history. Similarly, though we trust that this year's general meeting will bear testimony to the activity which pervades the gas and water industries in all directions, and though we see some improvements attained, and others in course of development, yet we may fitly extend our glance this year to a more distant horizon, and review the general technical and social conditions which lie at the root of our engineering activity.

Since the last general meeting at Cassel, we have passed the turn of the century; and in this eventful age it already seems far behind us. The light which was directed at that time on all our national affairs would make any retrospect of them now appear commonplace. Nevertheless, amid the multitude of ideas and impressions which the turn of the century presented to us, one ever-green fact recurs to the mind of every German engineer who has at heart the love of his profession; and its value to him cannot be over-estimated. I refer to the promotion of the study, and the recognition of the services, of technical science and practice by the Emperor of Germany.

After the great festival of the Berlin Technical College last autumn, the principals of the three technical colleges of Prussia, expressed through Privy Councillor Riedler, who has been the leader in the technical education movement, their acknowledgments to the Emperor. In reply, His Majesty made an improvised speech which betrayed the depth of his views and intentions, and filled all who were present with a deep sense of gratification. It should lead every association of German engineers to revise its programme, and to act hereafter in accordance with the spirit of the Emperor's words. These were as follows: "It has given me much pleasure to have the opportunity of conferring distinction on the technical colleges. Very great obstacles had to be overcome; but they have now been set aside. It was my desire to give a foremost position to the technical colleges; for very great problems, social as well as technical, have to be solved through their agency. Hitherto, these problems have not been solved as I should desire. You, of the technical colleges, are in a position to exercise widespread influence on social and moral relations; for your many associations with labour, workmen, and industry in general, present great opportunities for stimulating and influencing others. Therefore in the future great tasks await you."

The programme presented by the Emperor in these pithy sentences is one which applies not merely to the technical colleges and educational bodies, but also to the present generation of engineers, who are already engaged in the practical business of life. By example and authority, they can most effectively aid in the solution of the social problems which appertain to their calling. Especially is this the case with the associations of managing engineers, which have to regard the ideal as well as the material problems of their industry. And precisely as in this our Association we have always kept up our knowledge of such high technical problems, intimately dependent on science, as come before us, so should we consider how we have fulfilled the second chief issue of the Emperor's programme—viz., the carrying out of our social duties towards our workmen. I would include among the workmen in this sense the lower orders of officials, who, often enough, in these times of solicitude for the working classes, are passed over and unrequited, though their wages frequently do not exceed those of the better paid of the workmen.

In order to obtain a knowledge of what is already being performed in social matters in our industry, and thus to learn the proper starting-point for further efforts, a paper of questions has been addressed to the members and associates of the Association, both at home and abroad. The questions are directed to ascertaining the existing arrangements for the welfare of workmen, apart from the ordinances and requirements of the law in this respect. So large a number of my colleagues and of managing bodies have responded with highly interesting communications, that I take this opportunity of rendering to them, in the name of the Association, most grateful thanks. Shortness of time, however, has made it impossible to review the whole of the materials, and especially to deal with the many different special clauses in the rules of benefit and pension funds and workmen's clubs. These will not now be considered in detail,

though plans of many benefit schemes, and the rules of numerous workmen's funds, are exhibited on the walls of this theatre. The result of the inquiries has, however, justified us in our view that, though much still remains to be done for the social welfare of those engaged in both municipal and private works, yet, in the gas and water industries, there are already many distinct and admirable arrangements which are deserving of wider recognition and adoption.

The directions in which we must work in carrying out the Emperor's admonition—that we must fulfil our social and moral obligations to workmen and other employees—can only be briefly indicated here. Whatever arrangements we make may involve some of the following matters—viz., the hygienic conditions of the workpeople, the technical methods adopted in working, the representation of the workmen, their wages, their benefit funds, their savings banks, their pension funds, and the means adopted for training foremen and officials.

No one, of course, would expect all these matters to be brought forward everywhere; for we know how different are the local conditions as regards our industry. Particular details of a scheme which have proved their worth in one place cannot forthwith be adopted without modification at another works. Certain general arrangements which are feasible everywhere can be defined, and they may be specified here: (1) The hygienic conditions under which the workman is engaged must be made as favourable to him as practicable. (2) The technical methods adopted in the industry must be such as will lighten as much as possible bodily toil.

With regard to the first question, of the hygienic conditions of the men, labour on gas and water works ranks among the most healthy and least dangerous. Our retort-houses and apparatus buildings are well ventilated and guarded. Proof of the favourableness of the conditions is afforded by the long service of many of the men and officials, especially of such as reside upon the works. As regards also the technical arrangements, these are in all new works directed to the employment of mechanical means to as great an extent as possible. Especially is this so with respect to the very arduous toil of stoking, which drawing and charging machinery, inclined retorts, and the vertical chambers of water-gas plant, have greatly minimized. There appears, however, to be one hygienic requirement which has been by no means universally conceded. I refer to baths and detached rooms for the use of the stokers. At every works this accommodation should be provided without question. Of course, every works cannot provide luxurious bath and eating rooms for the men. In many cases, works are on too small a scale—especially as, in comparison with large works in other industries, few workpeople are employed thereon; yet, if the desire exists, a bath room and workmen's room can in almost every instance be partitioned off or built. Among the exhibits in this theatre are whole series of examples taken from medium-sized or small works. The arrangements at the Zurich Gas-Works are also shown by drawings; and the Manager, Herr Weiss, rightly says: "The capital expended on these arrangements, will not only benefit the workmen and the gas-works, but also the families of the men, as the habits of cleanliness acquired on the works will be imported into the family life. Consequently, the claims on the sick and benefit funds will be correspondingly diminished."

On large works, special eating rooms for the men should scarcely be dispensed with; and the new gas-works at Charlottenburg affords a fine example of an erection of this kind. Those gentlemen who, together with their English *confrères*, accepted the hospitality of the Municipality of Charlottenburg, will recall with pleasure the model accommodation erected there on technical lines. For large works also must be mentioned, as worthy of imitation elsewhere, the drying-rooms and ventilated drying-cupboards for the wet clothes of workmen arriving at their work, such as are provided at Strasburg, Winterthur, and Copenhagen.

It seems that workmen's dwellings have been found necessary at a few works only, probably because, as already stated, the men employed are comparatively few, and dwellings can readily be found for them. Some large installations of workmen's abodes have, however, been projected—for instance, by Herr Joly for the municipal gas-works at Cologne.

Workmen's representative organizations of a permanent character appear to exist only comparatively rarely. Opinion in our industry is much divided as to their value and serviceableness. Much must depend on the character of the working classes of the place. The circular issued has revealed the existence of only seventeen of these organizations in addition to those of the German Continental Gas Company. This peculiarly social establishment, however, in all cases where its working has been carefully observed, is much appreciated, notably by Herr Joly, of Cologne. I am also able to confirm this from experience of the senior delegates, who have been in existence for 12 years in my own Company. In critical times, when other speakers besides these have turned up, we believe we have avoided many a crisis by knowing, on the first symptoms of discontent, with whom we had to deal. When demands were made, we were in a position to treat with a representative elected by the workmen themselves in untroubled times. The more extreme elements are found in the van only in times of excitement, elections, and so forth. The rules of some workmen's organizations are here.

Many means are adopted in different works to secure a capable and reliable staff of workmen. In this connection, wages are of great significance. Apart from wages, which rise steadily, bonuses are recommended at many places. They are regulated by scale according to the duration of service. For instance, after five years' service, a single payment of 50 to 80 shillings; after ten years' service, one of £5; after fifteen years' service, one of £7 10s.; and after each five years over and above this, £2 10s. more. At some works also the workmen are entirely relieved of their obligation to contribute to the sick fund and invalid insurance. Personally, I think this arrangement a questionable one, as all lawmakers contend, and most social politicians also recommend, that charity should not be bestowed on the workmen, but that they should be required to contribute to their own insurance funds, &c. It is highly desirable, and in most works appears practicable, that workmen and officials retain their full pay during military exercises. In many works, including those of my own Company, there is a desire to secure a staff of distinctly good workmen, and to grant them a short period of leave in the summer according to the length of their service. For instance, after one year's service, two days' leave each summer; after five years' service, three days each summer; and after ten years' service, four days each summer. Of course, full wages must be paid during this leave-time.

The pension funds are of the utmost importance to the officials of gas and water works. In this matter the municipal undertakings have a great advantage over private works, as they can grant similiar pensions to those given to officials in other branches of the municipal service. Private companies, however, have not the same continuity and permanency as local authorities; and in their case a pension fund must be endowed with a very large capital in order to make sure that the obligations can be met. The obtaining of large capital is made difficult owing to the fact that when the fund is started, the older officials object to paying up contributions for the period of their service which has already expired. Consequently, the capital in respect of these expired periods of service must often be provided by the works in full. The German Continental Gas Company have endeavoured to solve this difficulty by making contributions to the fund out of the profits of specially good years. A professional actuary should be called in from time to time to ascertain the position of the fund in the case of private companies. The rules of some such funds are exhibited here. Provision for widows is covered by the regulations of these funds in most instances. The bulk of the pension funds only make provision for the officials; but some are for both officials and workmen. Two cases exist where the funds are for workmen only. How much the precaution is felt to be needed, however, in the case of officials and many other classes of workmen, is shown by the fact that, to the question in the circular as to whether pension funds existed, not unfrequently the laconic reply "*unfortunately* they do not" was given. The provision of pension funds should be demanded in the case of municipal works; but for private works, which are not in a position to start them, it is desirable that, so far as the health and age of the officials allows, they should be provided for by life insurance. The firm of Messrs. Julius Pintsch, among others, has introduced this system. Similarly, Messrs. Körting Brothers grant an insurance policy after four years' service. Also it is well known that a fixed sum can, by agreement, be made payable on such a policy at the 60th, or some later, year of life. Benefit and relief funds to meet those cases which are not covered by the State sick, accident, and incapacity insurance, are much to be commended. They can be administered either by the Sick Fund Committee, where one exists for any particular works, or by the senior delegates, in which case the influence of the workmen's representative body over the workmen is considerably increased.

Finally, the consideration of the thrift funds or savings banks, which are unfortunately little esteemed on our works, must not be omitted. The circular has revealed only eight works in which these exist, in addition to the works of the German Continental Gas Company. Two of those works grant interest at 5 per cent. on the deposits of officials and men; others let the age bonus, which generally commences with five years' service, be wholly, or as to one-half, entered in the thrift fund books. The system introduced by the German Continental Gas Company appears to answer excellently. It has now been in existence for four years. The deposit can be made in any selected public savings bank. The Company then make an addition, the amount of which is determined from year to year, to the interest allowed by such outside banks. This addition was raised, in consequence of the favourable circumstances of the last few years, from 5 to 7 per cent., so that the depositors now receive 10 per cent. in all. To avoid abuse of the system, the maximum deposit is fixed at 10 per cent. of the year's earnings of the official or workman, and these earnings for the most part need never be reckoned to exceed £225. The savings in the first year amounted to about £950, and have risen to something like £4900 in the fourth year. A cursory calculation will show that the grant to meet the interest allowance could easily be made by most works.

Among other arrangements for the welfare of the workmen and officials, there is to be greatly recommended the provision of instructive and amusing, and especially illustrated, papers in the workmen's lobbies. Also officials' clubs, and even skittle alleys, where officials and foremen could meet, would contribute to making pleasant the personal relations of officials and workmen to their superiors. In addition, social evenings for the families

of officials and men have been arranged—in St. Gall, for instance—with excellent results.

This fleeting review presents a cheerful picture of social efforts which can nowhere be introduced as a whole, but which should stimulate us to put them into practice as far as possible in our respective spheres of action. The efforts must be made having regard to the particular class of works and the management. In any case, the Emperor's appeal—"You have great problems to solve, social no less than technical"—should be made to us with good results, because the majority of our works are under municipal control. Arrangements for the welfare of workmen can more readily be introduced in these than in small private works, because of the permanency of the corporation and the existence of similar arrangements in other branches of municipal enterprise. In addition to the words already quoted, the Emperor said further: "Our technical education has already achieved great results. We need very much technical knowledge throughout the country." Assuredly it is of far greater use to the German people than many imagine. The achievements of German technology in the last three decades have certainly affected the technical knowledge throughout the country but very little, and by no means to the extent which is necessary for the continued development of the Empire. For though we in Germany believe that at the present time we possess an advantage in the scientific training of our engineers, yet a comparison of the *average* technical knowledge throughout the country with that found in other cultured nations is certainly not favourable to Germany. The average technical knowledge among educated people in general, apart from the professional men, is smaller with us than with, for instance, the greater of the cultivated nations, England and America. This fact can be observed in the course of any journey abroad. The educated man, more especially one who has received the usual classical training, with us has assimilated incredibly little of the great practical and scientific attainments of the time, although they are constantly brought before him. Electrical technology alone, in virtue of State patronage and the energy of those exploiting it, has at last succeeded in arousing general interest. But whoever has had occasion to be present at the sittings of English Parliamentary Committees, for instance, will have been astonished at the average technical knowledge of the members, as displayed in the questions which they ask, the results of their inquiries, and their decisions. These Committees have to deal with the granting of monopolies in the gas and water industries, as well as with tramways, &c. The same remark will apply to the hearing of patent cases in the English Courts by Judges who have had no special technical training.

The extent of the technical knowledge and practical experience of English and American men has been brought home to the German nation on several occasions lately in connection with many economical questions of political importance, and in their representation by ministers, consuls, and colonial officials. For the benefit of those who have not gained such an impression from their personal experience abroad, I may relate a little incident which should serve to remind them of many similar occurrences. At the time of the Chicago Exhibition, I was driving along the bank of the river from the Falls of Niagara to the rapids lower down, and I entered into conversation with my driver on the subject of a hurricane which had raged during the night. He supported a remark as to the force of the hurricane with a statement, which he had evidently culled from a morning paper, that the wind had possessed a velocity of so many feet. This driver was a simple man of the country, not an educated European. To my inquiry as to the velocity of ordinary high winds in that locality, he gave me a quite intelligent reply. Again, when interruptions occur in the tramway services, instead of the customary energetic expressions of annoyance which are all we hear in Germany, you find in America intelligent conjectures made as to the probable cause and nature of the interruption, and how it is being grappled with. I am surely not the only European engineer who has been struck on such occasions by the high average degree of intelligence of Americans and Englishmen. On the contrary, to take one instance out of many, I recollect not long ago an educated German gentleman who was dining in a room in which were burning many incandescent *gas* lights, remarking, when the conversation turned on them, "Oh, I thought the incandescent *gas* light was worked by *electricity*." This cultured countryman of mine and the American driver have often come to my mind as typical examples.

How astounding, too, is the ignorance of technical matters often displayed at the present time in the mandates of public authorities. In our own industries we have every year to be on our guard against such misconceptions. I will pass over the full details of the most recent instance of this nature—I refer to the great increase in the number of fires which have of late years occurred at electrical stations, and the works of leading firms of electricians. Among these may be enumerated fires at central electrical stations, exhibitions, theatres (*e.g.*, the Comédie Française), Krupp's Germania wharf, and at least eight large shops or warehouses. Of the latter, those at Munich, Frankfort-on-the-Maine, Brunswick, and Rixdorf excited special notice. [Since the above was written, two more large warehouses have been burnt out at Solingen and Brunswick, and the newspapers give "short-circuiting" as the origin of the outbreaks.] Even the ladies who patronize these establishments have of late been asking what this dreadful short-circuiting is. Yet there has just appeared an order of a German police authority, which permits the use of electricity *only* in the warehouses, and prohibits gas entirely. In this case, the question which the Landgraf puts to Tannhäuser, in Richard Wagner's opera, after he had been away a long time for well-known reasons: "Tell me, where have you been tarrying so long?" could quite appropriately be asked the technical adviser of the police authority.

We need scarcely look among the upper and lower classes of our people for proof of the truth of the Emperor's words, "We need very much technical knowledge throughout the country." But how is this better technical knowledge to be secured? The technical colleges can only provide one factor in the problem, even though they are yet further moulded and supported according to their own wishes. The starting-point for an extension of technical knowledge must be reform in the upper schools and of the disability Acts. Thanks to the opportune action of the Emperor, these are now down on the "Orders of the Day," and will not easily be struck off, however great may be the opposition, which, according to him, will be directed against them with redoubled force. The Association of German Engineers has, moreover, done a special service in this direction by its pronouncement on behalf of the body of scientific engineers. We need here only direct attention to the valuable speeches made at the meeting on the 5th of May in Berlin, without repeating the views expressed there and elsewhere on the classical and practical scientific training. It is specially the duty of our Association, which is concerned with such important public interests and functions, to take up a position on some at least of the main issues of the question, and endeavour to wipe out the greatest of the prejudices which have always involved it.

We engineers cannot reiterate too frequently how deeply we respect, and are grateful for the past and present work of, the classical grammar schools and universities, and how we look to these schools for great results in the future. We cannot overemphasize how far are we from wishing that classical studies should be made to play a quite subordinate part. But classical training has served in the past as the only equipment for all the higher professional callings—just as the monasteries in still earlier times were responsible for all deep learning and not merely for the study of divinity. Modern times, with their manifold problems requiring educational training, undoubtedly demand a more far-reaching distribution of work in the teaching of our subsequent special scientific studies. Such is the consequence of the continually increasing number of subjects of scientific education, and the impossibility of extending further the time spent at school. At one time, the courses of instruction of the technical colleges could be framed so that the first two terms were devoted to making up for the defects in mathematical and physical training of those who had just left the grammar schools. At an earlier period, when our international commerce was in its infancy, a knowledge of foreign languages could be acquired incidently as occasion might demand. To-day, however, international competition has become so keen, that a much more profitable use must be made of time; and, owing to the greatly increased number of fields of scientific knowledge, sound, but not one-sided, instruction in mathematical science and languages must be given in practical lower and upper schools.

I cannot, however, make it my business now to do more than glance at the rich field for discussion which this disability or qualification question presents. But I would refer you in particular to the speeches and writings of Privy Councillors Riedler and Slaby, who have championed this cause. There is one point, however, which has been passed over lightly in the discussions of this question, which I consider of great importance. It has not failed to escape the keen observation of the Emperor, who has expressed a wish, in the course of the speech already quoted, that the best families of the country would train up their sons for technical pursuits. While we all heartily endorse this wish, we are aware that its fulfilment is practically out of the question so long as the qualification rules give privileged positions only to those who have passed through the grammar school curriculum. Thus, certain old families traditionally retain great influence, and secure important positions, which are not accessible to engineers or others who have had a technical or business training. Yet at the present time, when the commercial development of Germany is becoming of so great importance, and our foreign commerce is assuming immense significance, it is highly desirable that these technical men also should have their share in the affairs of the State. Moreover, in consequence of the privileges accorded to those who have passed through the grammar schools, not only do the sons of families in the upper ranks of society receive their education there in order to be in a position to occupy the higher positions in the State, but even those of us who are in the less exalted ranks of society are constrained to select the same schools in order that our sons may not be under any disability. Thus it comes about that the more practical and commercial schools do not secure the best material in the first instance. People send their most promising sons to the grammar schools, in order that they may not be restricted in the choice of a career, and that the higher public and social positions may be open to them. It therefore comes about that the raw material with which the grammar schools and the practical and commercial schools have to deal, is by no means of the same quality.

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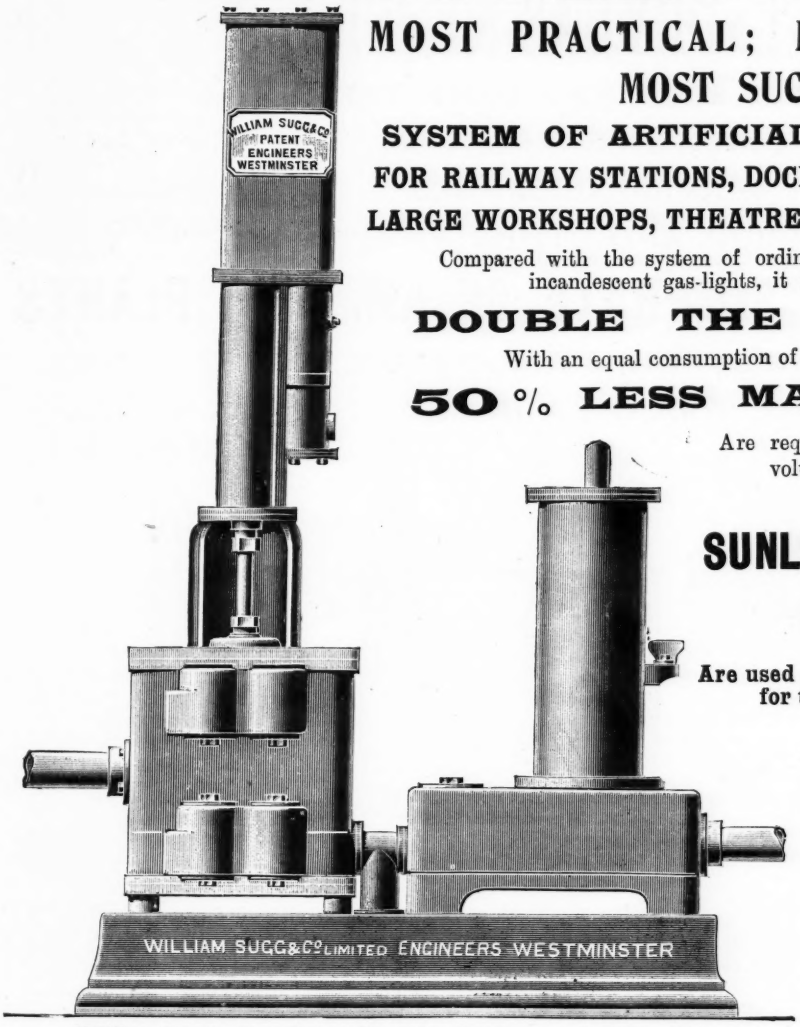

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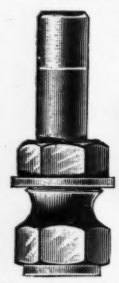
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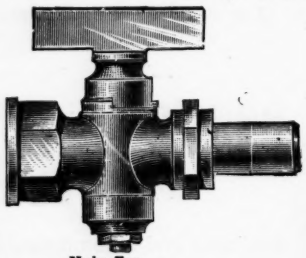
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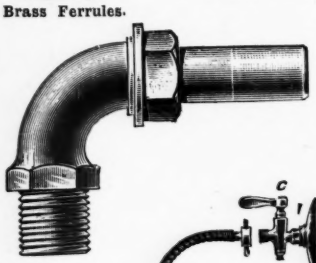

Leakage Detector.

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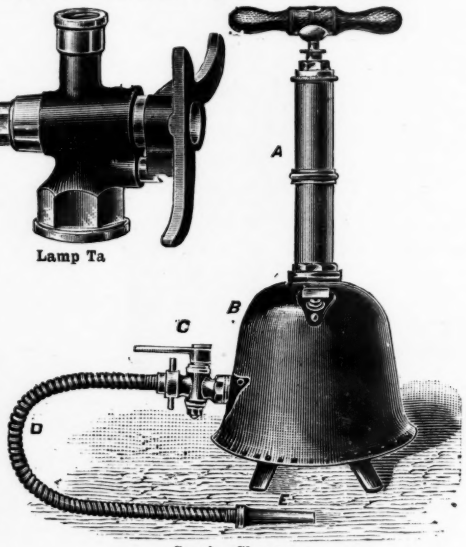

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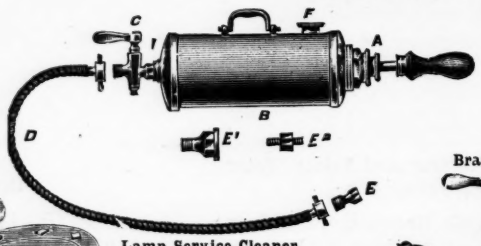
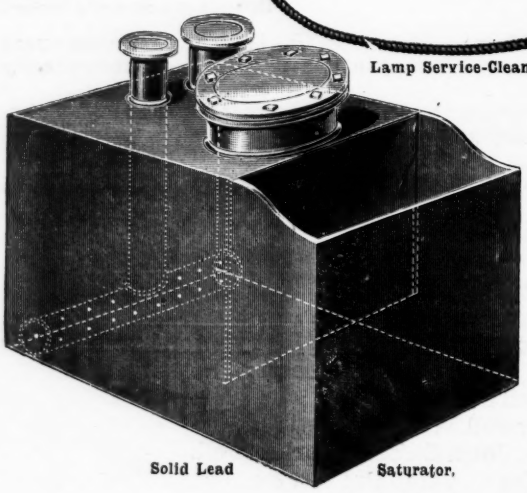


Lamp Service-Cleaner.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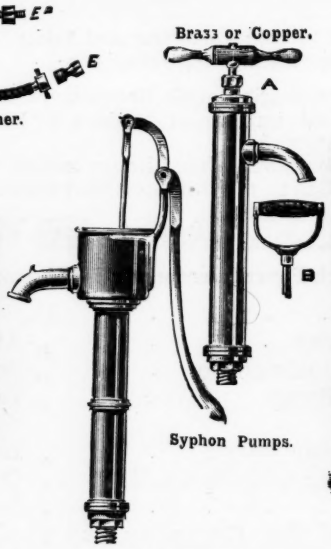
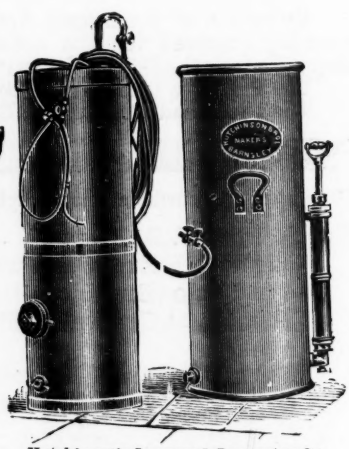


Syphon Pumps.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in the country according to the Emperor's wishes, the leaders in technology are drawn from an inferior grade of men. Those who have passed through the science schools often are noticeably lacking in general education and address. Their faults must not, however, be laid at the door of science, as such accomplishments are to be acquired from no school or college, but only in the social atmosphere of the old families of the land. And as those who are naturally favoured by high position and birth proceed to the grammar schools as a matter of course, it is small wonder that those who have succeeded in attaining good positions in technical spheres frequently do not appear well fitted to fulfil the duties of leaders and rulers. If, however, the best families would follow the Emperor's behest, and devote their sons to technical pursuits, matters would be otherwise. Before this can happen, the upper science schools must be given an equal position with the grammar schools of the country.

It is frequently alleged that if all the professions were opened freely to those trained in other schools than the grammar schools, the learned professions, especially those of medicine and law, would be overcrowded. But, on the other hand, if the stamp of inferiority were removed from the practical and science schools, many of those who now betake themselves to the grammar schools would instead apply themselves to practical technical pursuits; and the older professions would, in reality, be less overcrowded. Indeed, the number of grammar schools, especially in the smaller towns, would probably decrease; and there would be fewer anxious to join the older professions.

When the relative advantages of the classical and scientific education are being considered, we can point to the fact that those who have raised themselves to the foremost positions in industry or commerce have shown themselves anxious to fulfil not only their statutory, but their ideal moral obligations to the people. The intelligence and insight which they have acquired in practical affairs especially adapt them to give practical effect to plans of idealists for the welfare of the people. And especially to indicate how the vocation of engineer is in no sense antipathetic to the comprehension and elaboration of the ideal in life, I may call attention to one of the best known and appreciated of our modern poets—viz., H. Seidel. Only a few of those who enter the great station of the Anhalt Railway in Berlin, which in its time was the largest on the Continent, guess that it was constructed by this poet, who was for over seven years a very active and capable engineer. He afterwards became a poet. He has himself recorded that only those who have no conception of the creative and fertile activity of the engineer would suppose that when his mind and imagination were afterwards turned in search of the ideal, they were cut off entirely from his earlier professional pursuits.

As further illustrations of the truth that the higher technical knowledge and intelligence rise, the more naturally do men turn to the embodiment of the ideal in life, I may mention that a deceased honorary member of our Association was a dramatist, and another honorary member and engineer founded the German Shakespeare Society. It is my opinion that in all circles, whether the training be classical or otherwise, individual temperament and upbringing play a far larger part than does the training adopted.

The present Gutenberg festival celebrates, as Count Posadowski pointed out when he opened the Gutenberg Hall, the far reaching intellectual benefits which have sprung from the one technical advance of the invention of moveable type by Johann Gutenberg more than four-and-a-half centuries ago. But as Privy Councillor Riedler has pointed out, printing is but *one* of the technical agencies for disseminating culture. The printing press, the telegraph, and means of communication are some of the agencies by which technical advances have facilitated the spread of civilization to the common good. The last five decades have witnessed greater intellectual advance, due to technical collaboration, than did probably the whole period from Homer to the nineteenth century. Goethe also expressed to Eckermann his opinion that the good roads and railways of Germany would effectually prevent her disruption! For the sake of her intellectual advance, and her position in international commerce and affairs, we may hope that the deep-rooted opposition in Germany to the movement for placing all the higher schools on an equality will be supported, even by the privileged classes. At the present time, the success of this movement is more than ever essential to the country's welfare. Absolute freedom for every superior calling is a necessity of the age; and we must bestir ourselves in our own sphere of influence to place this question uppermost—not merely for the sake of our engineering profession, but for the general intellectual and cultural advance of the German nation.

It is of supreme moment to us, and our very position in the world is wrapped up in it. We must not confine our attention to abstract principles and theories, but above all dutifully perform the social tasks which the Emperor deems to be equally important with our advances in science and practical affairs. In aiding in the solution of social problems, in disseminating technical knowledge throughout the country, and in making provision for the welfare of the people, we shall find a worthy ideal in and about our life's vocation. By such means we shall help to stem the flood of materialism. Arm in arm with science, we may thus obey the mandate of the Emperor that we should apply ourselves with all our strength to the great economical and social problems of the age.

REPAIRING A SUBMERGED WATER-MAIN.

In the course of a paper read by Mr. D. W. French at the last meeting of the American Water-Works Association, he gave the following account of the repair of a 30-inch submerged water-main:—

The 30-inch main which forms the subject of this paper is one of three force mains which connect the principal pumping-station of the Hackensack Water Company (reorganized) with their reservoirs at Weehawken (N.J.); the distance between the two points being practically 14 miles. The main in question is not laid the entire distance between the pumping-station and reservoirs, but is connected to a 20 and 24 inch main at Ridgefield, 10 miles from the pumping-station. The main was laid during the season of 1897-8; and after being carefully tested between each gate as the work progressed, was brought into use in April, 1898, and continued in service without any interruption until the afternoon of Aug. 19, 1898. Then the pressure of 102 lbs. at the pumping-station, against which the engines were working, suddenly dropped so low that it was evident that a serious break had taken place somewhere on one of the force mains. These extend over a distance of practically 40 miles, and at several intersections are connected with each other. At the time the break occurred, the engines were running with these connections all open, in order to reduce as much as possible the working pressure, and consequently the cost of operation. As the distance to be covered was so great, considerable time was taken up by the men in getting to the gates which had to be shut; but as soon as the connections were closed, which enabled us to prove each main separately, the difficulty was found to be with the 30-inch main, and the break was finally located at a river crossing, on the bed of which the main lies, and over which there was 11 feet of water at low tide.

With the 30-inch main out of commission, and crippled in a place which made its repair a question of weeks rather than days, with the daily consumption over a million gallons greater than what could be delivered through the 20 and 24 inch mains, even after raising the pressure to 120 lbs., and with a stock on hand of 20 million gallons, it was decidedly too evident for comfort that more water must be delivered into the reservoirs at Weehawken than it was then possible to send, that we must run at the pressure named on the 20 and 24 inch mains, or else prepare for a water famine as gracefully as possible.

About 2500 feet north from where the break occurred, the street in which the 30-inch main is laid intersects a turnpike road, along which the 20-inch main lies; and from this point south the mains are parallel with each other for practically a mile. About 300 feet north from this point of intersection there is a gate on the 30-inch main, which is the first gate north of the break, and consequently closed. I felt positive that, if the 20-inch main was connected to a point on the 30-inch main above the closed gate, and water delivered through the latter from the pumping-station into the former at this point, the advantage would be the loss of friction between these two places, and would result in an increased delivery of from 2½ to 3 million gallons per day.

As we were fortunate enough to have sufficient material on hand to make this connection, which required 300 feet of 20-inch pipe, a 30 in. by 30 in. by 20 in. branch, a 20 in. by 20 in. by 20 in. branch, a 20-inch gate, bends, &c., work was commenced early the next morning, and, by working continuously with alternate gangs, was completed late in the night of the following day. After this connection was opened, we were able to deliver 12½ million gallons per day at 120 lbs. pressure, which showed the effective value of the bye-pass to be 3,150,000 gallons per day. This was also emphasized a week later, when, due to the exceedingly warm and dry weather, the daily consumption exceeded 13 million gallons.

The method adopted in making the repair to the 30-inch main is not based upon any established precedent, so far as I know, but upon what seemed to be the best, quickest, and cheapest way to accomplish the result. It seemed practicable to make the repair in two ways—either by sinking a caisson in the usual manner, or by raising the pipe from the bed of the river high enough above low tide to permit the removal of the broken length and the substitution of a new one. After looking at the case from all sides, it seemed that the latter method was practicable, and that it could be done more quickly and for less money than the former.

After engaging a pile driver, scow, tackle, and diver and his apparatus, and making provisions for such other requirements as were needed, the work was commenced. On the first examination, the diver reported that he had found the broken pipe, which was of the Ward joint type, cracked on the bell end, parallel with the axis of the pipe, and very near the top, and that the slit followed along the pipe for about 3 feet, then turned at an angle of about 90°, and passed round for a distance of about 3 feet. He reported that the opening was 1½ to 2 inches wide.

The river across which the pipe lies is practically 500 feet wide, but the location of the broken pipe was about 100 feet from the north shore at low tide, and exactly in front of a draw in a bridge which crosses the river at this point. In general, the method of operation decided upon was to drive piles in bents; in the centre of each length of pipe, from the shore out to the break, cap the piles with 12 in. by 12 in. yellow pine, break out a length on the

shore above the tide, and raise the pipe gradually and intact about 3 feet above low water, and hold it suspended while the broken length was removed and a new one substituted.

In order to facilitate the work, it was first necessary that the pipe should be free to move endwise on the shore end, otherwise, in raising it from its bed, we should be lifting against an inverted arch. Some difficulty was experienced in breaking the shore pipe, which is 1⅛ inches thick, and weighs 550 lbs. per foot; but it was finally accomplished, after several unsuccessful attempts, by the use of dynamite.

As soon as the piles were driven and capped, the diver passed round the centre of each length a heavy chain, to which was hooked a three-sheave block and fall, which was hung from an eye-bolt in the cap-piece on top of the piles. When everything was in readiness, the process of lifting was commenced, which required a considerable time, as only a short lift could be taken at any one time, and every change from one tackle to another involved the moving of the pile driver from which power was obtained. Measurements were taken almost continuously from the surface of the water, which served as a good level, in order to guide the work, and to make sure that the joints were not being unequally strained.

Some difficulty was experienced in starting the pipe from the bed of the river; but after it was started, the lifting continued until the pipe was several feet above the bed, and the weight, which represented 60,000 lbs., was supported by the piles and capping. By rigging up another block and fall from the shore end of the pipe, which was now suspended, to the mainland, very little difficulty was met with in separating the two lengths, as the crack in the bell was about 2 inches wide, and did not therefore offer much resistance.

After this was done, the broken pipe was raised until it was about 3 feet above low tide, which enabled us to cut off the broken pipe and remove the spigot from the adjoining bell. With this part of the work done, it now remained to raise the end still lying on the bed of the river to the same level as the first section, which was accomplished by driving fourteen more piles in seven bents, capping them as in the previous case, and repeating the operation of lifting.

After the pipe was raised to the proper level, a new length was put in place and the joints run; and the work was then ready for the final lowering. As the pipe when ready to lower formed an arch, the radius of which was about 100 feet, and in its descent the arch must necessarily be reversed, it was absolutely necessary to keep the pipe, from the break inshore, suspended so that it would be free to travel endwise, until the balance of the section picked up was down on the bed of the river, after which the inshore end was lowered into its place. Before making the final connection on shore, the end of the pipe was plugged, and the section in the river tested for leakage.

After the pressure had remained full on for an hour or more, it was turned off, and the falling of the pressure, as shown by the gauge, was satisfactory evidence that there was some leakage at the joints, due to their movements in raising and lowering. These leaks, which were several in number and all small, were found, and made tight by the driver. After the testing was completed, the final connection was made, and the main again put into commission; the repairs having been made in 15 days, at an actual cost of $2258. The cost of material and labour for making the bye-pass connection was $1300; so that the total cost amounted to $3558. When the break in the river took place, it was accompanied by an effect which, in my experience, was unusual. The distance, as already stated, between the pumping-station and the break is practically 10 miles south, and yet about a mile north of the pumping-station a 12-inch main, and 1½ miles south two 6-inch mains, were broken simultaneously.

Utilization of Water Power in Italy and Spain.—We learn from the "Electrician" that plant is to be put down, by La Società Ferrovie e Tramvie Elettriche Varesine, to utilize the water power of the Giona stream for the generation of electric energy. At first three large 500-horse power alternators driven by turbines are to be provided; electric energy being utilized in the operation of the Luino-Varese electric tramway and for lighting and power purposes generally. It is proposed to instal a plant to utilize the water power of the River Ottaven, in Galicia, for the generation of electric energy, and to distribute it to a number of small towns in the district.

Electric Traction.—At the meeting of the Society of Engineers on Monday last week, Mr. Algernon H. Binyon read a paper on "Electric Traction." He said that in London tramways—horse and cable—carried 309,000,000 passengers, or 45 per cent. of the total traffic; the underground railways 128,400,000, or 19 per cent.; and the omnibuses, 248,600,000, or 36 per cent. The whole population of London—5½ millions—travelled 124 times in a year; while the New York population of 3½ millions travelled 210 times yearly. He favoured the overhead trolley system, used in nearly all English towns, as being the most efficient and economical, especially the form known as the side trolley system, which obviated the unsightliness of very long brackets. In combining lighting and tramway plant, Mr. Binyon advocated the use of completely separate dynamos and mains. He recommended the use of meters in cars, and said that from 30 to 40 per cent. of the waste caused by the careless handling of controllers could be saved.

REGISTER OF PATENTS.

Treating Earthy Oxides in the Manufacture of Incandescent Mantles.—Daix, V., of Paris. No. 10,083; May 12, 1899.

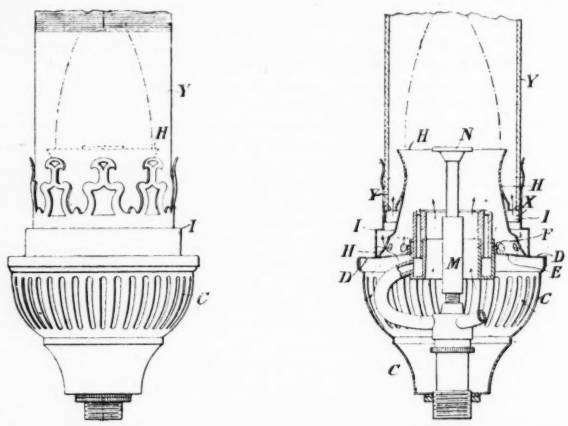
This invention relates to the treatment of ordinary earthy oxides—such as lime, magnesia, baryta, strontia, &c.—with a view to their employment in incandescent gas lighting.

The treatment consists in combining the oxides with sugar, glucose, or other combinations containing carbon, to form "sucrates, glucates, or other similar combinations," which, after being burnt, leave a carbonaceous residue that preserves the oxides from the action of gases and the moisture of the atmosphere. Under the action of heat, the sugar, glucose, and the like entering the salt, loses its moisture, becomes decomposed, and nothing remains but a carbonaceous residue, in the pores of which the oxide is lodged, whereby it is rendered insensible to the action of the moisture and atmospheric vapour produced by the combustion of gas. To the sucrates of ordinary earths, may be added oxides of rare earths—yttrium, thorium, zirconium, &c.—according to the colouring desired for the incandescent body.

In order to further strengthen the incandescent body, the patentee proposes to cover wires made of platinum or aluminium, with the salts, or with asbestos in a naked state, or wrapped in cotton, flax, or hemp fibres.

Circular Flame Gas-Burners.—Darby, H., W., & I., and Punchard, J. H. & W. C., of Cannon Street, E.C. No. 10,616; May 19, 1899.

It is claimed that, by the use of this invention, "novel and striking effects" are produced—"the flame having very much the appearance of the present well-known incandescent gas-burner with mantle, although no bunsen burner is employed, and no mantle is used or intended to be used."



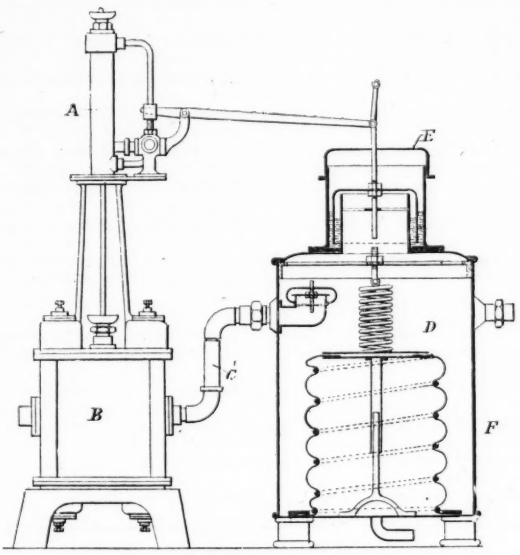
D is a horizontal flat rim or ring with downwardly-extending flange, within which latter the basket C is held in position. E are inwardly-extending arms which carry the central collar or burner-mount F. H is a cone or hood mounted concentrically with the burner, and secured to the upper side of D—at a point a little outside its projecting inner edge. As the hood extends upwards, it contracts until above the top edge of the burner, and then is widened out and terminates at a point about ¾ inch above the top of the burner. At the lower part of the hood H there is a clear annular space between the exterior of the burner and the inside of the hood, which latter, near its bottom edge, is provided with a series of apertures leading into an annular enclosed air-heating chamber X, formed between the outer side of the lower part of the hood and the jacket I. This latter is provided with a series of outlet-apertures within the interior diameter of the chimney Y, so that, when the chimney is in position, a supply of heated air will be led through the outlets from the annular chamber X, in between the inside wall of the chimney Y and the exterior of the upper part of the hood; and such supply of heated air is caused to impinge on the exterior of the flame just as it rises above the top edge of the hood. M is a vertical central post fixed to the burner; and mounted on it is the button or flame "spreader" N, supported level with the top edge of the hood.

The air supply entering through the basket or restrictor C is led to the flame by three separate annular passages—namely, (1) through the central annular passage formed inside the burner, between the post M and the inside wall of the burner; (2) through the annular passage formed between the outside of the burner and the inside of the lower part of the hood; and (3) air (coming from the annular heating chamber X) is led through the annular space formed between the outside of the upper part of the hood and the inside of the lower part of the chimney Y, and impinges on the outside of the flame as the latter emerges above the top of the hood. Upon lighting the gas coming from the burner, these several air-currents, "acting in conjunction with the special arrangement and construction of the burner, cause the flame to produce a brilliant light, while the spreader acting in conjunction with the hood and arrangement of air-currents causes the flame to assume a somewhat conoidal or conical form, as indicated by the dotted lines."

Compressing Gases for Lighting Purposes.—Sugg, W. T., of Westminster. No. 12,870; June 20, 1899.

The patentee remarks that in incandescent gas lighting (as is well known) the heating medium—a mixture of gas and air—must be under a certain amount of pressure to produce any result at all, and the greater the pressure, within reasonable limits, the better the light. In places where the pressure is not sufficient, it has been proposed to increase the pressure in an installation by mechanical means—water or other suitable power. In such apparatus, it has been found desirable to have an arrange-

ment to cut off the supply of motor fluid when the pressure in the apparatus exceeds that required for the gas-burner. It has also been found that the light fluctuates: First, when the pressure-increasing apparatus is changing its direction; and, secondly, when the cut-off acts too rapidly, which it is liable to do. The object of the present invention, therefore, is to combine a cut-off with means whereby this fluctuation will be prevented.



A is a water or other motor, and B is a gas compressor of any approved type. C is the pipe leading gas from the compressor to a receiver D—a valve being provided for preventing back-pressure against the compressor. On the summit of the receiver, is arranged the automatic cut-off for the motor. This preferably consists of a gas-bell dipping into a mercury well, and supporting a vertical rod adapted to operate a lever connected with the supply-valve of the motor. E is a casing enclosing the gas-bell and other parts connected therewith—all of which are described in patent No. 21,144 of 1898.

The action of the automatic cut-off (as is well understood) depends on the rise and fall of the bell weighted to the desired extent, according to the pressure within the receiver D. Co-operating with this cut-off, is what the inventor proposes to term a flexible piston F, which is capable of collapsing under undue pressure of gas, and of expanding again when the pressure is reduced. This piston is situated within the receiver D, and is attached to the bottom of it, through which there is communication with the air to the interior of the piston. The piston is supported, either from above or below, by an adjustable tension-spring attached, in the former case, to a fixed cross bar, and provided circumferentially with a coiled spring, as shown.

The employment of the flexible piston F has the effect of neutralizing the fluctuations which arise from the action of the compressor, by relieving the cut-off from the shocks and irregularities incidental thereto. "Regularity of pressure in the receiver is thus maintained, and a maximum efficiency as regards gas pressure is assured."

Cement for Caulking Retorts, Pipes, &c.—Woodhouse, S. J., of Leeds. No. 13,573; June 30, 1899.

This "non-porous and non-shrinkable cement" is composed of fire-clay (raw or burnt), cast iron (or cast iron and steel) borings, glass (or pottery) refuse, and lime (or forge slag); the whole being ground to a fine powder and thoroughly mixed, preferably in about the following proportions: Fire-clay, 50 per cent.; cast-iron borings or steel borings, 25 per cent.; glass refuse, 12½ per cent.; and forge slag, 12½ per cent. The proportions are slightly varied, according to the degree of heat to be sustained. Thus the proportions given are suitable for joints or parts which are to be worked at a white heat, while for hydraulic and steam joints, or any joints worked at comparatively low temperatures, the amount of fire-clay and borings would be slightly increased—the glass refuse and forge slag being correspondingly decreased.

When required for use, the cement "is mixed with water to form a paste of suitable consistency, which, when applied, sets into an absolutely non-porous, non-shrinking, and non-expanding mass."

Illuminating Media for Incandescence Gas Lighting.—Apt, J., of Berlin. No. 16,053; Aug. 5, 1899.

The process of manufacturing incandescent bodies or illuminants by means of such compounds of thorium and cerium as will withstand high temperatures, and are not liable to change into oxides during the combustion of the fabric, but remain undecomposed, has already been described (the patentee remarks) in patents No. 2000 and No. 14,448 of 1896—the arsenates and antimonates having, according to these patents, proved especially suitable for this purpose. It has, however, been found that incandescent bodies thus manufactured can only be kept in good condition for a very limited period, as the commercial nitrates of the rare earths are highly acid; and, moreover, under the action of arsenic acid, &c., upon such earths, nitric acid is disengaged, according to the following reaction:—

$$2H_2O + Th(NO_3)_4 + 2As_2O_5 = Th(AsO_3)_4 + 4HNO_3.$$

This nitric acid very rapidly destroys the threads or fibres of the support, and renders them unfit for the further operation upon the incandescent body—the "burning off." Incandescent bodies produced in accordance with the processes have the further disadvantage of being highly hygroscopic. Consequently, the insoluble arsenates will react with the disengaged nitric acid according to the following formula:—

$$Th(AsO_3) + 4HNO_3 = Th(NO_3)_4 + 2As_2O_5 + 2H_2O.$$

Hence the soluble constituents are gradually dissolved out of the fabric, and the quality becomes impaired. This defect is specially noticeable in factories where the incandescent bodies are not "burnt off," but which only supply the impregnated fabrics ready for being "burnt off."

To neutralize the nitrate solution by ammonia is, under the circumstances, inadmissible, seeing that even on adding only a single drop of it, oxides will be precipitated. It is equally impossible to subsequently treat the impregnated fabrics with ammonia; since, instead of the desired arsenates, only oxides will again be obtained. Attempts have, however, been made to obviate this disadvantage by employing the borates, arsenates, and antimonates in a highly basic state; but this again has the great disadvantage that the bodies are entirely insoluble, and it is consequently only possible to cause them to deposit from a state of suspension upon the fabric, or to rub them in a solid state. Incandescent bodies manufactured in this manner are quite useless, as it is impossible to obtain an even distribution of the material applied, and the latter during transport, &c., is liable to fall off, owing to it adhering to the fibre only externally, and not penetrating it. The fabrics thus impregnated are, moreover, useless, for the reason that, since the substance adheres but loosely to the outside, it is neither admissible for the fabric to be "burnt off" nor to be acted upon with compressed gas.

The object of the present invention is to produce incandescent bodies by soaking the fabric in special solutions, suitable for this purpose, so that within the fabric itself insoluble neutral compounds of the rare earths are produced, such that a decomposition due to disengagement of acid is entirely impossible; and hence these incandescent bodies are "distinguished by an extraordinary durability and light-emitting power."

To employ those basic arsenates and antimonates indicated in the patents already referred to, is not possible in the case of the present invention, because actual solutions must be operated with, and not substances merely in suspension. The patentee has, however, discovered that it is possible to produce fabrics which contain only insoluble salts—arsenates and antimonates—besides neutral nitrates, and which are entirely free from acid, so that any corrosion of the fabric by the intensely hygroscopic property, in view of the re-forming of the soluble salts in connection therewith, as well as any deterioration in the quality, are avoided.

For this purpose, the fabric is not soaked in a mixture of the nitrates and arsenic or antimonic acid, but is first soaked in a solution of basic nitrates of the rare earths, and subsequently in so much arsenic acid or antimonic acid as to correspond in quantity to the free oxide contained in the basic nitrate. The manufacture of the solution of the basic salts, which forms an integral part of this process, is effected by mixing, in the proportion of one to two, an aqueous solution of commercial nitrate with freshly precipitated and well lixiviated thorium hydroxide; the mixture being then heated (preferably in tubes closed by sealing or fusion), to a temperature varying between 140° and 150° C. In this operation, the hydroxide combines with the nitrate to form a basic compound, which cannot be obtained in a solid and soluble form, but which at the same time does not precipitate even on cooling.

In this manner, basic nitrates can be obtained which (dried at 100° C.) contain as much as 70 per cent. of oxide, while in ordinary nitrate only 48 to 49 per cent. is contained. These basic nitrates correspond to the formula: $Th(NO_3)_4 - 2ThO_2$. The fabrics are first impregnated with this solution, and then, while still moist, are impregnated with a solution of arsenic acid or antimonic acid, and dried; insoluble arsenates or antimonates being formed during this process without any nitric acid being set free. Thus:—

$$3\{Th(NO_3)_4 - 2ThO_2\} + 8H_3AsO_4 = 3Th(NO_3)_4 + 2Th_3AsO_4 + 12H_2O.$$

The concentration of the solution of arsenic acid should be such that the amount of arsenic acid corresponds to that of the oxide contained in the basic nitrate.

Combustion Chambers of Internal Combustion Motors.—Lindemann, O.; a communication from E. Körting, of Hanover. No. 7208; April 18, 1900.

In internal combustion motors in which the charge is compressed before ignition, it is necessary (the patentee remarks) to cool the charge while it is being compressed, if it is desired to avoid the objections dependent on such high compression and temperature of combustion. By this invention, the cooling is effected by enlarging the cooling surfaces in the combustion chamber, for which purpose either the walls themselves are provided with folds or ribs, or a specially cooled body of metal is placed in the chamber.

Fig. 1.

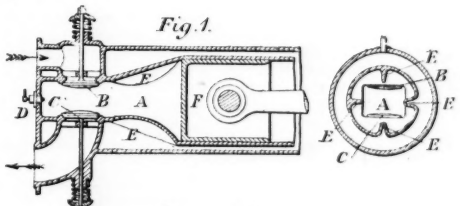


Fig. 2.

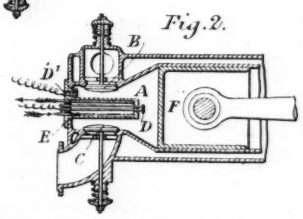


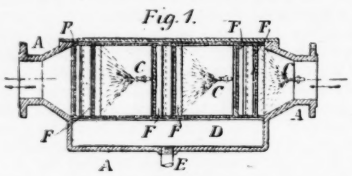
Fig. 1 shows in section (on planes at right angles to each other) a combustion chamber provided with folds or ribs. A is the chamber,

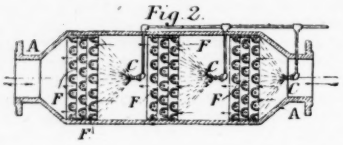
with its valves B and C, for admission and exhaust. E are the ribs and folds, by means of which the cooling effect of the water-cooled walls is carried near to the middle of the chamber. F is the piston, and D the igniter. The number of folds or ribs and their surface are determined by the degree of compression and the capacity of the chamber; also by the ignition and dissociation temperature of the gases—the general rule being that the cooling surface is larger in proportion as the capacity of the chamber or degree of compression is increased, and as the dissociation or ignition temperature is lower.

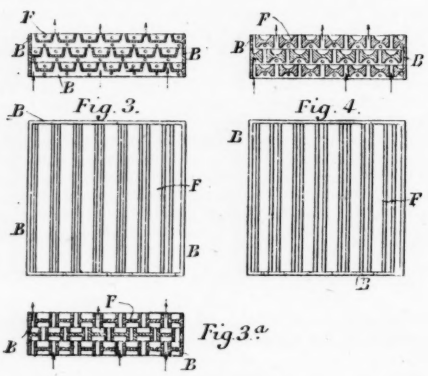
Fig. 2 is a section of a combustion chamber A, provided with a cooled metal tube E projecting into it. On the end of the tube is an electrical igniter D; and another such igniter D^1 is placed at the bottom or end of the chamber. This arrangement of igniters renders the combustion of the charge "quick and certain."

Purifying Gases.—Lindemann, O.; a communication from E. Körting, of Hanover. No. 7209; April 18, 1900.

Gases which contain impurities consisting of fine dust or smoke particles (it is pointed out by the patentee in his specification) cannot, except with great difficulty, be completely freed from these while they are dry. The present invention relates to purifying apparatus in which the gases, before arriving at the place of purification proper, are artificially moistened with a liquid spray. The separation of the dust particles is then effected at the same time as the drops or vesicles (and the liquid formed from these) serve to carry off the dirt. The accompanying drawings illustrate a purifying apparatus of this kind.







In figs. 1 and 2, A is a covered box in which are arranged (behind one another, and separated by intervening spaces) three sets of frames F, each consisting of three rows arranged close together, in such a manner that they nearly touch the walls and the cover. The bottoms of the intervening spaces are covered with plates. Under the frames and the cover-plates there is a space D. Between each set of frames there is arranged a spray-nozzle C or several of these, which fill the intervening space between the sets of impact frames with a fine liquid spray, which mixes with the gas and flows with it through the next set of impact frames, where the moisture is precipitated along with the dust, and drips down into the space D, whence it flows away by the pipe E.

The frames in which the impact surfaces are arranged (constructed according to known principles), in general, are provided with vertical rods, between which are slots through which the gas flows. The rods and slots in each of two successive frames are so arranged that the rods of one frame are opposite to the slots in the next frame; so that the gas which flows through the slots of the one frame strikes against, and is deflected by, the rods of the other frame, and the particles of dirt remain attached to the impact surfaces.

Fig. 3 illustrates frames constructed in this manner, which are provided with straight impact surfaces. B are the frames, with rods of U-shape in cross section. The two vertical edges of two adjacent rods form between them the slot for the passage of the gas. At the foot of the rods holes are provided in the frames which allow the precipitated matters to flow off. Fig. 3*a* illustrates a similar frame in which the rods are H-shaped in cross section, instead of U-shaped; so that the gas is compelled, after flowing through the slots between the bars, to return to the rearward hollows of the same bars before it passes into the slots of the next row of bars. Thus a powerful eddying action is produced "that promotes considerably the aggregations and precipitation of the non-gaseous particles."

Fig. 4 shows a construction of the impact surfaces which is similar to that of fig. 3A, but with the difference that these surfaces are made concave on both sides, so that there is a constant deflection of the current of gas on its way from the slots of one row of bars to the slots of the next row, combined with a correspondingly powerful centrifugal pressure of the heavier particles of moisture and dirt against the bars, "increasing their adhesion, and the consequent dripping or trickling down."

APPLICATIONS FOR LETTERS PATENT.

10,238.—Swain, A. C., "Gas-generating apparatus." June 5.
10,255.—Edgeworth, T. F., "Gas heating-stove." June 5.
10,300.—Whittle, A., "Illuminant appliances for gas-burners." June 5.
10,329.—Gans, P. F., "Igniting apparatus for explosion engines." June 5.
10,354.—Evans, W., "Globe-holders for incandescent gas-burners." June 6.
10,358.—Clark, A. M., "Pumps for exhausting or compressing gas or air." A communication from Pokorny and Wittekind. June 6.
10,431.—Davis, H., "Incandescent burners and fittings." June 7.
10,432.—Bower, G., "Mixing and burning inflammable gas and hydrocarbon vapours and air for the production of light, heat, and power." June 7.
10,433.—Bower, A. S., "Generating illuminating gas from metallic carbides." June 7.
10,442.—Grabowski, G., "Igniting device for lamp-burners." June 7.
10,461.—Wright, J. W. B., and Darwin, H., "Gas boiling-burners.' June 8.
10,467.—Prunell, T. L., "Operating the taps of gas-lights." June 8.
10,514.—Bower, A. S., "Carburating and increasing the pressure of combustible or incombustible aeriform fluids for the purposes of heat, light, or power." June 8.
10,515.—Glover, J. G., "Gas-lighting torches." June 8.
10,574.—Wünsche, R., "Generating gasoline gas." June 9.
10,583-4.—Green, W. O., "Gas and other meters." June 9.
10,588.—Schniewind, F. W. C., "Enrichment of gas." June 9.
10,589.—Schniewind, F. W. C., "Treatment and utilization of gases." June 9.
10,591.—Sieverts, W. H. A., "Incandescent gas-burners." June 9.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Carpenter-Brackenbury-Winstanley Controversy.

Sir,—I hope the accident of following one's vocation in London is not generally considered a disqualification for forming an independent judgment upon any particular process—especially after trying it. I do, however, protest against the suggestion of the existence of a geographical delimitation of area within the pale of which honest convictions do not flourish, or are incapable of formation.

I feel sure your correspondent will be the first to withdraw such an implication when he knows more of those against whom it is levelled.

June 16, 1900. Charles Carpenter.

LEGAL INTELLIGENCE.

A Disputed Gas Bill.

At the Westminster County Court last Thursday, the Gaslight and Coke Company sought to recover £7 5s. 10d. from Thomas William Everard, a laundryman, for gas supplied to premises in Worship Street, E.C. The defendant signed the usual contract, and gas was supplied and paid for for some years. No notice of discontinuance was given; but when the above-named amount was demanded, defendant said a Receiver in Chancery was in possession, and as he had paid the rent and all other charges, and took all the profits, he must pay this. His Honour, in giving judgment for the plaintiffs, said the agreement was binding; and until notice was given defendant must pay.

Claims Against the Newport Gas Company for Wages.

At the Newport County Court last Thursday, his Honour Judge Owen had before him a series of actions arising out of the recent dispute between the Newport Gas Company and their employees (*ante*, p. 1559). In the first case taken, Mr. Maney, a yardsman, sought to recover 19s. 6d., a week's wages, in lieu of notice. The evidence showed that on the 13th of April, and some days after, 24 men, members of the Gas Workers' Union, had been discharged. The plaintiff was asked, after he had done a day and a quarter's work—from 6 a.m. to 7 p.m.—to go and wheel coal in the retort-house. He said he could not wheel coal in such a hot place, and would not try it, especially after the long day he had done. Thereupon the foreman said they had had enough of him, and told him to go. Next morning, by direction, he received 3½ days' pay, and now claimed the full week in lieu of notice. Mr. Whitfield, the Superintendent, said plaintiff was engaged as a general labourer, not as a yardsman. The plaintiff had often been very stubborn, and he and 26 more had to be discharged. Plaintiff and others were having meals on the premises, and plaintiff absolutely refused to help with the newly-imported men. Next morning he pressed plaintiff to return to his work; but he demanded his money. Witness did not tell plaintiff to go into the retort-house to work, but to return so as to be ready to help in case he was wanted. Another action to recover 21s. for a week's wages in lieu of notice was brought by Albert Smith, service layer's labourer, engaged in outside work, who on the 1st of May was asked after his day's work to unload coal and load coke inside the works. This plaintiff had, however, signed a discharge in full for 16s. 8d. Ivor Jeffries, a yard hand, also claimed a week's wages. He returned to work on the Saturday evening (April 14), and worked several hours; but on being asked to wheel hot coke in the retort-house he declined. He was one of the men fined for intimidation by the Newport County Magistrates (*ante*, p. 1454). His Honour held that Smith and Jeffries had discharged themselves; and he gave judgment against them. He allowed Manley's claim, and also one for a guinea to a fourth complainant, John Coles, who was called to work in the yard, and was afterwards ordered into the retort-house.

MISCELLANEOUS NEWS.

WELSBACH INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Friday last, at the Cannon Street Hotel—Sir HENRY BURDETT, K.C.B., in the chair.

The SECRETARY (Mr. W. R. Few) read the notice convening the meeting; and the report of the Directors (which was noticed at length in last week's "JOURNAL," p. 1559) was taken as read.

The CHAIRMAN said it was a great pleasure to him to meet the shareholders, because he always felt that, whatever else might be uncertain, there was no doubt but that every director, and every chairman, must regard himself as being the servant of his shareholders, whose interests it was his duty to use his utmost powers to protect and further. He was very glad to see so many shareholders present; for it showed the great interest they took in the affairs of the Company. He could quite understand there might be questions to answer; and possibly there might be amendments to move. The business before the meeting was very important; and first of all he would take the report a little in detail. They would observe that the gross profit on the trading of the year to March 31 last, on the plan previously adopted in preparing the accounts, was £170,553, as compared with £155,914 in the previous year. The gross profit, however, instead of appearing in the balance-sheet as £170,553, was shown as £159,029 only, owing to certain re-arrangements of the accounts made at the suggestion of Mr. Peters, who commenced his duties as Managing-Director on the 1st of January last. The object of these re-arrangements had been that the accounts in future should show more precisely the trading results, and therefore be more satisfactory to the shareholders. The alteration, however, did not affect the result shown by the accounts—namely, an increase in the gross profit as compared with the previous year. These figures, whatever else they might show, proved the progressive character of the business done by the English Company; and they could not, therefore, fail to be satisfactory to all possessing any knowledge of the true interpretation to be placed upon the figures of a commercial business of such an extensive character as their own. The net profits for the year amounted to £120,789. It was unfortunate that the net profits shown in the accounts previously issued were for a period of about sixteen months, so that it was impossible to give corresponding figures from those accounts which were exactly comparable. So far as they were applicable, it would seem that the net profits of the past year showed a decrease of about £42,000; and the cause of this falling off was made clear in the report. He would specially emphasize the diminished dividend in Austria, which represented a shrinkage of no less a sum than £24,269 on the dividends. He wished further to impress upon the shareholders that the net profit brought into the balance-sheet presented to the meeting last June not only dealt with a longer period, but included exceptional profits, arising out of the necessary adjustments owing to the accounts covering a period prior to the date of the incorporation of the Company. Passing to the expenses charged against profit and loss for the year, he said that, as compared with those charged for the previous year, they showed a total of £101,724, against £93,498, or an increase of £8226. This increase was covered by three items—advertising, &c., £498 increase, law charges £4071, and anti-vibrator royalties £3750; making a total of £8319. There were decreases in the items shown under salaries, rents, and audit and accountancy charges, which were counterbalanced by increases in depreciation, reserve for bad and doubtful debts, and interest. Last year he referred specifically to the Auditors' certificates. In view of the criticisms passed upon it, the Board decided to submit the accounts and a case to eminent Counsel, asking him whether it was necessary for the Directors, before arriving at profits, to make any provision for depreciation of patents and patent-rights, goodwill, and shares in the Austrian Company. Counsel advised that "it is clear that the Directors are not bound to take into consideration, before declaring dividends, any possible depreciation in goodwill, patents, and patent-rights; shares acquired in the Austrian Company which were paid for out of the capital subscribed by the shareholders of the Welsbach Company; shares in the Austrian Company since acquired; the benefit of the contracts securing continuity of service; and the benefits of the contracts for the acquisition and satisfaction of the local Austrian interests." Counsel further advised as to the proper wording of the first item on the credit side of the balance-sheet. The Managing-Director and the Auditors had taken great pains to issue the statement of accounts in a form so clear as to be readily understood by everybody. They were all anxious to give the shareholders a plain, unvarnished statement. In a great enterprise like theirs, the trading policy was all-important. A cardinal fact to be borne in mind was that the first paragraph of the report proved that the trading of the Company was of a progressive character. Shareholders would observe that there had been an increase in the number of mantles sold; though the sale of burners showed a falling off. Possibly they might be aware of the attacks that had been made on the new Welsbach burner by competitive undertakings. These attacks had been of the most mischievous character, because they had thrown doubts upon patent-rights, created feelings of indecision in the minds of the trade, and made them hesitate to take up or supply the new burner to the public. Such circumstances must retard the business done in new burners. The Board looked forward, however, to an early settlement of the legal position regarding the burner patent, which would remove, once and for all, the bad effect of these attacks. He ventured to hope that the shareholders would not form any false impression from a decrease in one section of the business, seeing that the combined output of the Company's productions reached enormous figures, counted by millions of articles, and that the business on the whole exhibited not only stability, but also vitality. This vitality there was every reason to hope would largely increase by the forward policy which the Board had decided to adopt. Dealing with the question of trading policy, they had to consider it from three points—the trade, the public, and the Company. It had been represented by their rivals that the Company had not met the trade in a liberal spirit; but the Managing-Director would inform them that the terms and conditions had been so improved that the rate of profit the trade generally could make upon the Company's products was greater now than formerly. Letters had been received from the trade in all parts of the country, expressing unqualified gratification at the reduction in prices, and predicting a large increase in business therefrom. This reduction must have far-reaching effects as regarded the public. A large number of people anxious to adopt the light had been precluded from doing so on account of their relatively small means, which made them unwilling to face the expense necessary to start an installation of the burners at the old price; and a further impediment arose from the cost of mantles for renewals at the higher price. The great majority of the people in this country lived in houses of £12 to £50 per annum rental; and most of these householders had been precluded, on account of the cost, from using the Welsbach system. But now the light had been brought within the reach of this class of people; and these new consumers should so add to the output of the Company's wares as to compensate the shareholders for any deficiency in revenue that might be involved in the reduction of price. The effect of the reduction was to give the public the opportunity of purchasing for a small house a complete installation of (say) six "York" burners for 15s., which would formerly have cost 24s. Again, the charge for the upkeep of the system in such a house was now less than two-thirds of what it was on last year's price list. It was his duty to point out to the shareholders that the criticisms which had been passed in regard to the legal expenses during the year were marked by an absence of knowledge of the matter. Critics pointed to the fact that the legal expenses were £4000 more than last year; and they implied that this increase was due to the litigation with the Sunlight Company. Nothing wider of the mark could be imagined. Although the legal expenses were £4000 more than last year, they were nearly £5000 less than in the year 1897-98, and were materially under the average of the last four years. The actual expenditure upon the Sunlight actions during the past year was considerably less than £5000; and against this had to be placed any damages which their Company might recover from the Sunlight Company when the matter was finally settled by the Law Courts. The balance of the legal expenditure had been due to the enforcement of an active protective policy for the prosecution of infringers throughout the country. To make this system effective, a large staff of travelling inspectors had been employed, who had been able to promptly detect and suppress infringements which might otherwise have made inroads upon the Company's revenue. The reduction in the price of their goods must have a direct bearing upon the legal expenditure, by rendering this policy of infringement less remunerative to those engaging in it. The Board thought that the reduction in prices should be accompanied by a reduction of the heavy charges in all possible directions. Personally, he had felt the necessity for this change very strongly; and his feeling was shared by the entire Board. With a view, therefore, of decreasing the expenses, the Board had unanimously agreed that the present Directors, other than himself and Mr. Peters, out of the sum of £4000 fixed by the shareholders as the remuneration of the Board, should accept £300 each for the year 1900-1901, instead of £500 apiece. He (the Chairman) agreed, on the Directors adopting this proposal, to voluntarily reduce his own remuneration from £3000 to £1500 for the same period; the other moiety under his agreement to be received by him at such time as the Company paid a dividend upon the deferred shares. He wished to prove by this act that nothing he could do should be left undone to make the new policy a complete success. In addition to this, from the commencement of the present year steps had been taken to reduce the legal expenses to a material extent. Mr. Peters had devoted his attention to the general charges, with the object of reducing them whenever possible. Steps had further been taken to lower the cost of manufacture; and great care had been exercised in regard to the stocks—the large sum of £27,658 having been taken from reserve in order to write down the stock to a basis which was fully explained in the report. Besides this, a sum of £10,000 had been set aside to reserve to meet the contingency of a further fall in value of materials in stock. To meet the wishes of a large number of householders, a system of maintenance had been elaborated, whereby everyone who possessed an installation of incandescent gas-lights could have it maintained for a reasonable and inclusive annual charge. The introduction of the Kern burner had been most satisfactory. These patents had enabled the Company to give a very decided impetus to incandescent street lighting. In the use of the Kern burner for ordinary lighting the increase was less marked; but it was progressive. The prices of the Kern burners had been much higher than those of the others; but the reductions in price which took effect on June 1 would doubtless lead to their more general adoption. Substantial improvements had been made in the Kern burner; and further important improvements were contemplated, which it was anticipated would greatly increase its popularity and utility. During the year under review, the Company's 1885 and 1886 patents expired; but the mantles were now, and had for some years been, manufactured under the patent of 1893, which would remain operative until 1907. It was expected that the action against the Sunlight Company for infringement of this patent would have been decided before the expiry of the 1886 patent. The management had done their best to meet the situation by increasing the amount of advertising. In regard to the future, he desired to again point out that the Company had settled their policy upon a commercial basis, as opposed to a monopoly; and in this way they hoped to be in a position to meet all possible competition. If they succeeded in the establishment of their 1893 patent, they would be placed in a condition of supremacy. The policy of the past year had been necessarily one of transition, notwithstanding which the trading results exhibited by the statement of accounts testified to the vitality of the business. Mr. Moeller resigned his seat at the Board in April last, having accepted the responsible post of Managing-Director to the Kern Burner Company, Limited, where his great knowledge should render his services invaluable. Mr. Moeller would also act as Technical Adviser to the Welsbach Company. On the retirement of Mr. de Fonblanque from the office of Joint-Manager, the Board took the opportunity to place on record their sense of his devotion to the interests of the shareholders and his high integrity on all occasions. As a Director of the Company, they hoped for many years to come to have the benefit of his wide experience. It was important that the shareholders should understand the position of the Austrian Company. The dividends paid by this Company during the last three years had been respectively 100, 80, and 65 per cent. This serious decrease in the dividend

on the Austrian shares was mainly owing to reductions made in the price of fluid. These reductions had not been accompanied in certain countries by a corresponding reduction in the price of mantles, which would have resulted in larger mantle sales and consequent increased consumption of fluid. This was important, because the factory in Vienna was large enough to face any increase in the output of fluid, and would yield a greater profit on a larger sale at the lower price than on a smaller sale at the higher price. As a consequence, shareholders of the Austrian Company had suffered from the effects of the transition period through which the enterprise was now passing, owing to the reduction in the price of fluid. Having explained at some length the position of Dr. Auer and the Austrian Company, with regard to any new electrical inventions of the former, the Chairman went on to say that he was sure the shareholders would desire to hear something of the new electric lamp. He could well understand that they were all anxious to learn the present position of this matter. At his (the Chairman's) earnest request, Dr. Auer had sent over one of the lamps for exhibition at the meeting; and he had also written saying that the osmium lamp would be available as a commercial commodity in the autumn. It was not possible for him, or for anybody else, to forecast with exactitude the future of the Company. It was not even possible to say that day what would be the effect of the present policy of the Board. Experience might show modifications to be necessary in various directions; and for this reason he asked for the Board the confidence of the shareholders, who he was sure would exercise patience. The future of the Company must largely depend upon their keeping abreast of technical developments. Before sitting down, he wished to say a few words in regard to himself personally. The reason he became Chairman of the Company, and had a large salary given him, was that he promised to give a great deal of attention to the enterprise. Now, to occupy his position properly, it seemed to him that he ought to have a considerable stake in the undertaking. His holding that day in the different shares of the Company amounted to £20,235, all of which had been acquired for cash. Further than that, on joint account he held £10,000 more ordinary stock. So that altogether his holding was upwards of £30,000; and he was one of the largest shareholders in the Company. One or two shareholders had expressed the view that he should resign his position as Chairman. The chairmanship of the Company was not sought by him. It was pressed upon him; but having accepted the post and the responsibility, he had made great sacrifices, and had worked hard to overcome the difficulties due to the transition period at which the business had arrived. For these reasons, he did not suppose that the shareholders to whom he had referred represented anyone but themselves; but he should decline to hold office one minute longer than the shareholders wished. He concluded by moving the adoption of the report and accounts.

Mr. C. L. Samson, in seconding the motion, explained that he had joined the Board, in conjunction with Mr. Peters and Mr. Harris, in July of last year. He did this at the request of holders of a very considerable proportion of the stock of the Company, who thought it desirable that new blood should be introduced on the Board. Their object since their election had been to endeavour to put the Company on a sound commercial basis; and the first thing they did was to bring about the appointment of Mr. Peters as Managing-Director. Mr. Peters was a man who had a splendid record for past achievements; and he hoped he would beat this record in what he would do for the Welsbach Company. Under Mr. Peters's guidance, the Company had taken what he considered was a very bold step—they had greatly reduced the prices of the burners and mantles. The Company's output had doubled since 1897; but even now it was nothing to what it might be. They were only supplying a very small percentage of the gas consumers of the country; but he believed that now they would rapidly make up the leeway,

General Russell, M.P., said he could not congratulate the Board on the clearness of the report. He took exception to the amount set apart for Directors' fees, and also to the legal expenses. Patents, he knew, must be supported; but the question was whether it was necessary to enter into these expensive lawsuits in regard to patents on the point of expiry. The decision on appeal concerning the 1886 patent was not given until the patent had actually expired. He also had great fault to find with the conditions on which the Kern burner patent had been purchased. He wished to move as an amendment—"That a Committee of seven members be appointed from amongst the shareholders, to make a full investigation into the affairs of the Company, and to make recommendations as to the future management and the constitution of the Company; and that the present meeting stand adjourned for one month to receive the report of the special Committee."

The Hon. Philip Stanhope, M.P., in rising to second the amendment, said he would confine himself to what he might call the striking features of the situation. Here was a great Company, with no less than £3,400,000 of capital, launched only two or three years ago under most flaming auspices and the most specious promises. At the end of this time, they found themselves in a position that was lamentable. There could not be one single shareholder who regarded the present position of the Company as a satisfactory one. He certainly thought it was a case—and an urgent case—for searching investigation. If the Committee were appointed, one thing they should do would be to consider whether or not the present very large capital was justified by the assets. He would sooner have his property in the Company represented by what it was really worth than by an inflated paper value.

Mr. M. Praed thought there was certainly great cause for complaint against the original members of the Board. These gentlemen would never have made the reduction in the price of the mantles and burners on their own initiative. Mr. Peters was alone responsible for the great advance that had been made. He appealed to General Russell and the Hon. Philip Stanhope to withdraw their amendment, because his experience was that Committees of Investigation did an enormous amount of mischief in a trading concern of this kind.

Mr. R. H. Green thought there was not a concern in the whole of the country that had been more grossly mismanaged than the Welsbach Company. The trade previous to Mr. Peters's appointment had held meetings for the purpose of boycotting the Company, owing to the treatment they had received at their hands. It only remained for them to get in good odour with the trade to be made a great success.

Some six or seven other shareholders having taken part in the discussion,

Mr. H. L. Peters said he joined the Board as an ordinary Director last July; and after acting in this capacity for some months, he was asked whether he would accept the post of Manager, which he agreed to do. The shareholders must have patience, because great changes in policy such as they had recently made took time to develop. The Company were strong enough to face any competition, quite regardless of the question of patents. He mentioned, as showing the extent of the Company's business, that it was necessary to send out from the office 28,000 parcels of circulars announcing the reductions in price.

General Russell, at this stage, said that as there seemed to be a general feeling that it would be only fair to give the Board another chance, he would ask permission to withdraw his amendment. He would, however, remark that, unless a more satisfactory report was presented at their next meeting, he and others with money invested in the Company would think it their duty to canvass the shareholders beforehand and endeavour to get a Committee of Investigation appointed.

The Chairman, in reply to various questions that had been put, said the reason why the 1886 patent appeal was pursued when the patent was about to lapse was that they were advised by Counsel that it was the best course that could be taken; the appeal being necessary to secure damages. As to the English Kern patents, these had been of most material assistance to the Company in reference to street lighting. The £80,000 given was for the British patents, with which the Kern Burner Company had nothing to do—they had only the Continental patents. The guarantee of the Welsbach Company in regard to the £100,000 of debentures of the Kern Burner Company was to run for ten years; and the Company was incorporated only last November. The Era Lamp and Kern Burner Company ordinary shares had not been taken into account in profit and loss.

The motion for the adoption of the report was then carried unanimously.

The dividends recommended were declared; and the retiring Directors (Lieut.-Col. W. Treslove Ellis and Mr. L. R. de Fonblanque) and the Auditors (Messrs. Deloitte, Dever, Griffiths, and Co.) were re-elected.

The proceedings closed with a vote of thanks to the Chairman and Directors.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 60, Gracechurch Street, E.C.—Colonel J. Le Geyt Daniell in the chair.

The Secretary (Mr. A. W. Cooper) read the notice convening the meeting; and the report and accounts (which were noticed in the "Journal" for the 29th ult., p. 1462) were then presented.

The Chairman said it fell to his lot to preside at the meeting in the absence of the Chairman (Mr. J. Birch Paddon) through indisposition—an absence which they would all regret (not only for its cause), and perhaps none more than himself. Though absent in person, he was present in a degree that the shareholders might not be aware of, for, notwithstanding his illness, he had devoted his attention to the affairs of the Company—at a time, too, and under conditions of pain and weariness, which they would all know did not predispose a person to bring his brains to bear upon abstracts and figures. As a result, Mr. Paddon had given him (Col. Daniell) his views; and he could not do better than give expression, as far as he was able, to some of the particulars which, had Mr. Paddon been present, he would have commended to the attention of the shareholders. The incidents of the past year were chiefly of a commonplace character, excepting those connected with the supply of coal. The great increase in the price of coal had, of course, a disturbing influence on the Company's affairs, in common with others; and it had somewhat rudely interrupted a progress which was decidedly satisfactory. They were fast repairing the breach in the Company's business made by the establishment of the electric light in Malta, and the loss of sale of 30 million cubic feet of gas caused thereby. Of this, they had recovered two-thirds without decreasing the dividends. The increase in the price of coal had a direct effect on profits. It was, as the shareholders were aware, only within limits that the price of their gas could be raised; and there was no doubt that some of the contemplated loss must fall on the Company. Of course, they were encouraged in the hope that the present high price of coal was merely artificial, and might not last long; but there was no immediate prospect of a return to moderate prices. All they could set against it was such an increase in the price of gas as they might be able to make, and the increase in the value of residuals. With these things, and possibly some little help from the reserve fund, they might fairly hope to maintain the present rates of dividend. There was a somewhat serious increase to be seen in the accounts under the heading of rates and taxes. This increase amounted to £596, and represented an impost levied upon the Company by the Italian Government in respect of their Sicilian station. Apparently the necessities of that Government rather blinded them to the consequences of an action of this kind; but as the Company did not stand alone, they could not help themselves. They resisted for a long time, and obtained the best of legal opinions. Short of going into Court—which was a bad thing for Companies situated as they were to do—they did all in their power to avoid this impost; but in the end they had to submit. The £596 in question was for back licences, for which the Directors never thought the Company were liable. Apart from disturbing things of this kind, the accounts showed much that was satisfactory, and which to a great extent qualified the adverse factor to which he had called attention. The receipts and expenditure presented much the same figures as before. Their investments had, however, been increased by an amount of £3744, which appeared under the heading of Consols. This sum consisted of arrears received from the Municipality of Marsala. Strictly speaking, it was revenue; but it was placed in the general balance-sheet and invested in Consols, because it was intended to utilize it for the provision of new works, &c. The capital account had not been altered in any way since it was last presented. In the general revenue account, the only difference was a small decrease in the debenture interest and the interest on the reserve fund. The items in the profit and loss account were more interesting. In the first place, coal had cost £1235 more. Certainly, they had used 419 tons, or equal to 4·38 per cent. more than in the preceding year; but even allowing for this, there would remain an increase of £840 in price. The item

of maintenance was £233 more; and this increase was caused chiefly by repairs to gasholders and by efforts to still further reduce the leakage. There was an increase in the item of rents, rates, and taxes of £648, to £596 of which he had already referred. The remaining items were collectively a little less than last year. The total revenue expenditure had been £19,759, or £2161 more than last year. This excess was practically accounted for by the increase in the price of coal, the extra Sicilian taxation, and the heavier charge for maintenance. The manufacturing operations of the year had been comparatively satisfactory. They had used 9982 tons of coal, and made 104 million cubic feet of gas, which was equal to more than 10,415 cubic feet per ton. Of this amount they had sold 91 million cubic feet, which left a difference of 12·46 per cent. between the make and the sale. This was an improvement; but they had reason to expect a still further decrease in the amount of unaccounted-for gas. The receipts side of the profit and loss account revealed an increase of £1056 in gas-rental. Coke showed an increased return of £307; tar and pitch was £30 less; and fittings £255, or 13½ per cent., more. The total receipts were £28,596, or £1617 more than last year. With reference to Malta, he (the Chairman) had paid a visit of inspection to the works last winter. Besides this, Mr. Basil Makins had visited the works early in the year. Their impression of things there was that matters were by no means discouraging. The rate of increase at Malta was over 8 per cent.; and there was a satisfactory addition to the number of consumers. At Sliema, there was an increase of 19 per cent.; and the improvements being made there by the Government would lead to the development of the land for building and other purposes, of which the Company would not be slow to take advantage. He must say that, when he was at Malta, he was received with the greatest possible courtesy by the heads of all the departments; and the relations of the Company with the governing bodies generally he considered to be of a very agreeable character. The resulting profit from the whole of the business was of necessity a little less than last year; but they were nevertheless able to pay their usual dividends, and to carry £312 forward to the next account. The several works of the Company were well maintained; and with regard to both works and mains, it might be said that they were never in better order than now. The accounts showed no receipts from Corfu; and this matter remained in much the same condition as in the previous year. The Directors had, however, received repeated assurances that the Municipality would pay as soon as ever they were in a position to do so—that was, as soon as they could succeed in raising a loan. He (the Chairman) had received every assurance personally on the subject. He saw the British Minister at Athens, who gave him to understand that he had no doubt whatever that the Company would be paid at the first opportunity. At Corfu, he (the Chairman) saw the present President of the Council; and he thought that in him they had an honest man. The Directors, notwithstanding the very great delay, still looked upon the account as good. At Trapani, there had been an increase of 2½ per cent.; but at Marsala there was a decrease of about the same amount. These two stations produced an amount which the Company would be very sorry indeed to lose. Regarding the coal difficulty as a passing one, the Directors were inclined to look hopefully upon the future; and they did not anticipate that it would be necessary to diminish or vary in any way the dividends they had hitherto been able to recommend to the shareholders. He concluded by moving that the report of the Directors, together with the balance-sheet and accounts, be approved and adopted.

Mr. Basil T. Makins seconded the motion.

Mr. A. M. Paddon hoped he might be permitted to congratulate the Directors and proprietors on the very able statement which had been presented. He ventured to say that these results could not possibly have been achieved without very considerable administrative skill on the part of the Board, and very great tact on the part of the executive abroad. The Board themselves had an intimate knowledge of the condition of things which prevailed where the different stations of the Company were situated. The difficulties and the embarrassments attached to the conduct of a Company like theirs were very different to what was experienced in the administration of a statutory Gas Company in England. A very high degree of diplomatic skill was required of the management. They had not, of course, to deal with the predatory instincts of local authorities which were so often in evidence in this country; but they had an arbitrary Government in Malta, and an equally arbitrary Government in Italy. Another thing was that the places from which their revenue was derived were scattered. This in itself constituted a very considerable demand upon their representatives abroad; but in Mr. Starkey they certainly had a very able Manager. His (Mr. Paddon's) sole object was to show that the duties of the Directors of such a Company as theirs were of an exceptional character, and that therefore success should meet with exceptional praise on the part of the proprietors. He thanked the Chairman most sincerely for his kind remarks about his (Mr. Paddon's) father. His father was extremely gratified to know that he was so well thought of by his colleagues.

Mr. A. W. Oke asked if the Board had well considered the question of the new contract for coal. They all knew of the crisis through which Gas Companies were now passing; and it would be comforting to be assured that their Company had been able to secure a satisfactory contract for coal. He would also like to know whether it would be necessary for the Directors to increase the price of gas—it seemed a very general experience in England. It was a relief to find that the extra amount of £596 for taxes was not likely to be permanent. He was also glad to see that the item of bad debts was so small, and that there was a satisfactory increase in the sale of gas, considering the great competition of the electric light. Though the balance carried forward was smaller than in the previous year, they had a large reserve on which they could, if necessary, fall back to make up the dividends. The price of the Company's shares in the market showed that the proprietors were not afraid to hold them, but looked upon them as good security for their money.

The Chairman said the Board thought the Company's contract for coal was of a satisfactory character; and he trusted that they would next year be supported by the shareholders in that view. They had raised the price of gas as much as they were able to do under their contracts. They would have liked to have increased it a little more, but this was not in their power.

The resolution was then put to the meeting, and carried unanimously.

On the proposition of the Chairman, seconded by Mr. Stephenson R. Clarke, dividends were declared at the rates of 7 per cent. per annum on the first preference shares, 7½ per cent. on the second preference shares, and 4 per cent. on the ordinary shares (making with the interim dividend of 2 per cent., 6 per cent. for the year).

Mr. Clarke proposed, and Mr. Joseph Cash seconded, the re-election of Colonel Daniell as a Director of the Company; and this was unanimously agreed to.

On the motion of Mr. Cash, seconded by Mr. A. M. Paddon, the Auditors (Messrs. R. Hesketh Jones and Thomas Guyatt) were re-appointed.

The Chairman said before they separated he wished to propose a vote of thanks to Mr. Cooper, Mr. Starkey, and the other officers of the Company. He could endorse what Mr. Paddon had said about Mr. Starkey's ability. He (the Chairman) was very much impressed at seeing the difficulties their Manager had to contend with—the class of people he had to meet, and the trouble with which he held his own against such absolute authority among the Government departments as existed, and must exist, in places of the kind in which their works were situated.

Mr. T. Guyatt seconded the resolution, and it was carried unanimously.

Mr. Cooper having briefly acknowledged the resolution,

The proceedings terminated with a vote of thanks to the Chairman and Directors.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly General Meeting of this Company was held at the Offices, Southwark Bridge Road, on Tuesday last—Alderman Sir H. E. Knight presiding.

The Secretary (Mr. Montague Watts) having read the notice calling the meeting, the report of the Directors for the six months ending March 31 was presented. In the course thereof they stated that the number of new domestic supplies taken into charge in that period was 646, estimated to produce an increased annual rental from this source alone of £1642, and, in addition, the income derived from meter-rates and other sources showed a satisfactory increase on the corresponding period of past years. They recommended a dividend at the rate of 5 per cent. per annum on the preference stock, and of 7½ per cent. per annum on the ordinary stock and "D" shares.

The Chairman observed that the proprietors would recollect that the accounts for the half years to March 31 and Sept. 30 last year were certified by the Company's Auditors, but not by the Government Auditor. He (the Chairman) explained at the time that there was no objection as regarded the accounts themselves on the part of Mr. Stoneham, but that that gentleman thought an alteration was required in the form in which they were presented. The Directors could not at first come to an agreement with the Government Auditor; and they were only able to do so in the past half year after a good deal of negotiation and several conferences with him. The adjustment of the accounts which Mr. Stoneham required was exceedingly simple; and as far as he (the Chairman) was concerned, he could not see that it made any difference one way or the other. The Government Auditor, however, in his capacity, seemed to think that he would prefer the accounts made out in the form in which he now certified them; and it therefore became necessary for the proprietors to accept and approve the adjustment. The only difference was in the dividend and interest account, on the debtor side of which, as it had been drawn up for some years, the interest on temporary loans was entered, thus reducing the balance applicable to dividend. Mr. Stoneham required that the item in question should be taken from the debtor and put on the creditor side of the account. The money applicable to dividend was not reduced by this amount; but it was paid out of the balance applicable to dividend. The alteration made not a penny difference in the amount available for dividend; but the change was more satisfactory to Mr. Stoneham. He then moved a resolution approving and adopting the amended accounts for the half years in question, "as adjusted to the satisfaction of the Government Auditor, and certified and signed by him."

Mr. C. M. Vialls seconded the motion, which was at once unanimously carried.

The Chairman afterwards proposed the adoption of the report and accounts submitted to the meeting. After pointing out that the latter had been approved by the Government Auditor, he stated that in the revenue account for the half year ended March 31 last, on the debtor side, the amount expended on maintenance appeared as having been £55,525, showing an increase of £2314 as compared with the figures of the corresponding period of 1899. If, however, the proprietors took the figures in this bald manner, they would be deceiving themselves, and would not arrive at a correct appreciation of the result. For example, the item of maintenance and repair of mains, &c., showed that the amount expended in the past half year had been £11,774, as against £14,000 in the March half of 1899. This would look as if a great deal less had been expended on this item in the past half year, whereas the outlay had been greater. In the March half of last year, there was included in the £14,000 expended £4200 for the cost of strengthening and additional work to the 42-inch main, whereas in the past half year the extra outlay on this main was only £600. This made a difference of £3600, which ought to be deducted from the expenditure of the March half of 1899 in order to come on an equal footing with the outlay in the past half year under this heading. The £14,000 would then be reduced to £10,444, which was the proper amount for the proprietors to compare with the £11,774 in the half-year's accounts now submitted. An increase was then shown under the heading of maintenance and repair of mains of £1330; and the proprietors would wish to have an explanation of this excess. More money had been expended on the lowering of those mains which had been laid at too shallow a depth, and which were therefore liable to be affected by frost. There had also been an enormous advance in the price of iron; and therefore all the pipes that had been laid in the past half year had cost a good deal more. Further, there had been a considerable advance in wages. These three items accounted for the increase. The only regrettable point in regard to the matter—if it was regrettable at all—was that the increase in wages was an item which they were still likely to have to meet; but he had no doubt that after a time the Company would obtain some relief as regarded the increase in the cost of iron pipes, and that they would also not be at

the extra expense of lowering the mains. With respect to this item, therefore, matters were pretty well in a normal condition, and would continue so. The pumping and engine charges had been £16,890, showing an increase of £3471 over the figures of the March half of 1899. This increase was entirely under the head of pumping, and was solely accounted for by the higher price of coal. The proprietors would therefore understand what an important effect this increase in the cost of a material which the Company must consume in order to perform their duties had upon them. Rates and taxes had cost £16,592, as compared with £15,110 for the corresponding period of the previous year. He was glad to state that a decrease was shown in the management expenses; the figures being £8572 last half year, or £1888 less than those of the March half of 1899. This was practically accounted for by the reduction in the law and parliamentary expenses, which in the past half year had amounted to £977, as against £3097 a year previously. On account of the sinking fund, £423 had been paid to the City Chamberlain, against nothing in the March half of 1899. Allowing for the decrease of £1888 in the management expenses, against the increase of £2314 in those under the head of maintenance, an advance of £426 was shown, taking the two items together; and adding this to the payment to the City Chamberlain, £849 appeared as the increase on the debtor side of the account, as compared with the figures for the corresponding period of 1899. The credit side of the account he approached with very great pleasure; and he could assure the proprietors that it was a great satisfaction to the Directors to find that they were able to come before them half year after half year, and to show a continual improvement in the Company's position. The water-rents accrued to the date of the present accounts amounted to £137,561, showing an improvement of £3614 as compared with the corresponding period of the previous year. But again an outside element had to be taken into consideration, or the proprietors might think that £3614 represented the entire increase under this heading in the past half year, whereas this was not so. The Company received from the East London Company last half year £1995 less than in the March half of 1899; and to arrive at the legitimate increase in the water-rents accrued, this £1995 had to be added to the £3614, making an improvement altogether of £5609 in the past half year. This must be exceedingly satisfactory to the proprietors, as it was to the Directors—showing as it did the innate vitality of their undertaking, and that it still continued to be progressively prosperous. As he had said, £5609 represented the legitimate increase in the water-rents last half year over the corresponding period of 1899; but as he had to deal with actual figures, he should only take the £3614. The rentals also showed an advance of £1133, which was accounted for by the interest paid to them by the East London Company, in respect of the communicating main laid by this Company, which cost them £47,000, and also by increased lettings of some portions of their surplus lands at Battersea. Adding this £1133 to the £3614, they arrived at £4747 as the actual increase of cash from these sources which had to be dealt with this half year. In the item of surcharges, £82 had been saved, while £89 less had had to be allowed for bad debts; and, on the other hand, a sum of £12 had to be taken off for something else. Dealing with these different amounts together, the sum of £4906 was arrived at as the extra earnings of the concern in the past half year, as compared with the corresponding period of 1899; but from this increase, the £849 of excess on the debtor side of the account had to be deducted, leaving £4057 as the actual additional profit to be taken to their dividend and interest account for the half year under review. They therefore had £72,142 to carry to the dividend and interest account this time, as compared with £68,085 a year ago. Passing to this account, it would be seen that, after paying the dividend last half year, a balance of £14,535 was left; and adding this to the amount brought down, £86,678 was shown as the sum that had to be dealt with. Deducting the interest accrued to March 31 last on the debenture stock, the dividend paid on the preference stock to Dec. 31 last, and the interest accrued on this stock to March 31 last, £47,306 remained, which the Government Auditor certified as the amount applicable to dividend. Out of this, the Directors proposed a dividend at the rate of 7½ per cent.; leaving £8732 to be carried forward. They might have proposed 8 per cent.; but they had not thought it wise to do so in view of the advance in the price of coal and iron. They had had great difficulty in arranging the Company's coal contracts; and they thought that the proprietors would agree with them that it was better to be on the safe side, and only pay the dividend at the rate recommended. The past six months, it should be remembered, was what was called their bad half year, while the next would be their good half year; and the Directors hoped to be able to advise the proprietors to take a little larger share then in the profits. Turning to the Directors' report, he did not suppose that any of the proprietors had read, as the Directors had been obliged to do, the evidence given before the Royal Commission on the Metropolitan Water Supply, or that they had watched the inquiry as the Directors had done; but they had no doubt read the summaries which had appeared in the Press. He did not think that the Water Companies had any reason to be dissatisfied with the result of the Commission. It had no doubt cost an immense amount of money to place before the Commission the real facts, and to put the Companies' case before them in such a way as to enable them to come to the decision at which they had arrived. The result showed that the Companies had been well advised, and that they had been ably represented before the Commission; and, further, that they had been able to convince the Commissioners of the correctness of the views held by the Companies. The proprietors gave their permission, at the Wharncliffe meeting held last February, to a Bill being introduced by the Company into Parliament; and it was duly pressed forward in the House of Commons. It was for carrying out a certain principle, enabling the Companies to combine for the construction of reservoirs and for other purposes, in order that the water supply of the whole of the Metropolis might be placed beyond any doubt. In face of the report of the Royal Commission, and for other reasons, it was, however, felt that such an object as this ought to be brought forward as a Government measure. The Directors were therefore advised that it would be well to withdraw the Bill; and this course was taken after the Bills of the London County Council had also been withdrawn. The Company were getting on very well with the other works which Parliament had directed them to carry out. He believed that his colleagues on the Board thoroughly agreed with him that the undertaking was never in a better or more prosperous condition, and that it had never had better prospects than at the present time. They were about to offer another £100,000 of debenture stock; and he only hoped that this would meet with the same success as that which attended the last issue in March, when the same amount was offered and was applied for four times over.

Mr. VIALLS seconded the motion, which was carried unanimously.

The CHAIRMAN afterwards proposed, and Mr. VIALLS seconded, the payment of the dividends recommended; and this was carried.

A resolution was next passed contributing ten guineas towards the completion of the New Victoria Schools, at Teddington.

The CHAIRMAN said he ought to have mentioned that the debenture stock which they were about to issue would carry three months' dividend up to September next, when the interest would go on in the usual way. Anyone, therefore, who subscribed for the debentures would not be out of-pocket as regarded income, which would immediately begin to accumulate.

An extraordinary general meeting was subsequently held.

The CHAIRMAN stated that under the Act of 1899 the Water Companies were authorized to spend money in constructing works for the purpose of intercommunication between their systems. The Company were empowered, with the consent of the Local Government Board, to raise a certain sum by debenture stock to represent the expenditure thus incurred, and the stock was not to be subject to the sinking-fund clauses. It would rank *pari passu* with their "B" debenture stock, but it would be different in the point just mentioned. The Company had laid out £47,000 on the works in question, and they would have to spend a little more, making perhaps £50,000 altogether. He concluded by moving the following resolution: "That the sum of £47,000, being the amount authorized by the Metropolis Water Act, 1899, and sanctioned by the Local Government Board at an inquiry held on the 10th of May, 1900, be, in exercise of the powers conferred by the said Act, raised by the Directors by the creation and issue of such debenture stock 'B' as will produce the said sum, on such terms and conditions, and at such times and in such manner consistent with the said Act, as the Directors may deem expedient."

Mr. VIALLS seconded the motion, and it was carried unanimously.

A vote of thanks to the Chairman, Directors, and staff brought the meeting to a close.

GRAND JUNCTION WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Office, South Molton Street, last Wednesday—Mr. F. TENDRON, F.G.S., in the chair.

The SECRETARY (Mr. J. Goodwin) having read the notice convening the meeting, and other formal business having been disposed of,

The CHAIRMAN moved the adoption of the report and the statement of accounts (*ante*, p. 1515). He said the proprietors would notice that in the revenue account there was a charge for the Staines reservoirs of £3000, and that in the balance-sheet this item had not been paid, as it was deducted from the amount which stood for intercommunication works, and was put in suspense. The reason for not paying it was that Mr. Stoneham, the Official Auditor, refused to sign the accounts of the Staines Reservoirs Joint Committee to June 30, 1899, for two reasons. One was because the Committee had allowed a brokerage of ¼ per cent. to all tenders which had been accepted from members of the Stock Exchange for their issue of £500,000 of the stock. The Act of Parliament authorized the Committee to issue the stock either by tender or by sale. If issued by sale, the Committee would have had to pay much more for commission and advertising than by this brokerage, and if they had endeavoured to issue it by public tender, they would in all probability have been unsuccessful; whereas a good price was obtained by them, and the amount was over-applied for. At present he need say nothing further on this point, although it might be necessary at a future time for him to ask the proprietors to allow the payment out of the Company's funds of the proportion for which they were liable on this account. As to the other point objected to by Mr. Stoneham, where the Committee bought lands and were unable to get a settlement—where they had had considerable legal difficulties—they had had to pay interest in the terms of purchase; and they were advised by their Solicitor, who was a leading authority on all these points, that this was a capital charge. They consequently took Counsel's opinion, which was that the whole of their expenditure, whether for interest on the debenture stock or the expenses of management, should go simply to a cash account, and so be charged to capital until the respective Companies received water from the reservoirs. This opinion was one of immense importance to the Grand Junction Company; and it was with much satisfaction that he informed the proprietors that the Staines Reservoirs Committee had given instructions that the accounts submitted to June 30, 1899, were to be made out on the basis of Counsel's opinion. The Directors calculated that probably 3½ years from the date he had mentioned would elapse before the Companies were receiving water from the reservoirs, and that during this time the Company would have had to pay out of their present earnings no less than £40,000, which would now be capitalized, and instead of having to provide £40,000 in 3½ years, they would have to pay for interest and sinking fund about £2000 a year for an indefinite period. The proprietors could see how much this strengthened the position of the Company, and what a large reserve they would have to meet the heavy expenditure they would have to incur when once water was delivered from Staines, not only for interest on debenture stock, but also for sinking fund and pumping charges, rates and taxes, and the supply of water. Dealing with the accounts generally, he said he would leave out of consideration the supply of water to East London, and only deal with the Company's normal receipts and expenditure. He found that, as compared with 1894, their rental earnings had increased by no less than £28,600. This was a most satisfactory feature in the accounts of a Water Company; but, on the other side, he found that rates and taxes and the rental they paid to the Thames Conservancy had increased £7000—leaving to the good £21,600. Their Engineering Director (Mr. Walter Hunter, M.Inst.C.E.) had managed, in the way of interest and dividends on additional capital, and by various improvements of the works, to dispose of the whole of this increase. The expenditure, however, had been very wise, and the position

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[See also Advt. p. 1604.

A "NEEDFUL" EXPLANATION.

We note an Advertisement in the "JOURNAL," under the name of the NEW CONVEYOR COMPANY, stating that they had taken over the business of the AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED; and, as it may create a false impression, we beg to say there are **NO VALID PATENTS** existing in connection with Inclined Retorts (beyond a few small and subsidiary ones, dealing with details).

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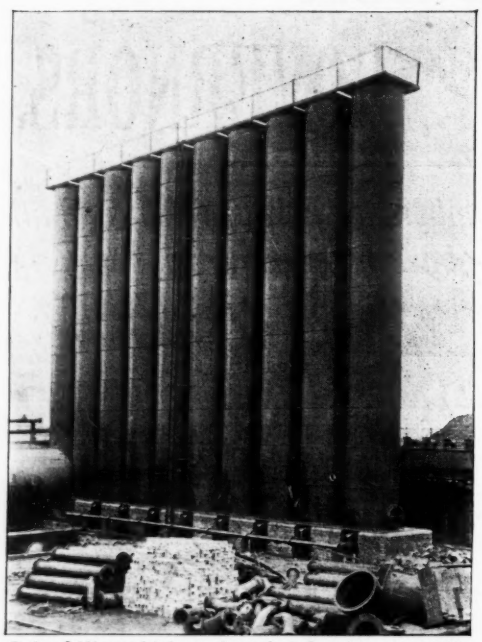

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STOCKTON-ON-TEES.

of the Company now was much stronger than it formerly was. The terrible frost of 1895 called their attention to many shortcomings which existed; and the Company now had engine power and filtration works capable of dealing with no less than 30 million gallons a day, although their normal requirements only averaged about 20 millions. They had the power of distribution to this extent—that in times of pressure they could give their own district fully 25 million gallons, and help the East London Company to the extent of 5 million gallons a day, if needed. This position was so strong that they might fairly conclude that, although the rental of the Company would in all probability rise by the average of £6000 a year, as for the last five years, there would be hardly any increase in the ordinary outlay for the maintenance of their works. It was true that coal and iron were dear; but this increased expenditure was exceptional. Taking all these matters into consideration, and reviewing the past five years, during which the shareholders had only received a dividend at the rate of 7½ per cent., whereas for thirteen years before the frost they had a dividend averaging 8½ per cent., they might probably ask what had become of the difference of 1 per cent. during this period. The answer was that a number of the mains in the country district had been relaid, and the proportionate cost of the work had been met out of revenue; and during this time the Directors had also put by about £21,000, which was now carried forward in reserve, to meet the heavy expenses he had referred to which would come upon them when once they were receiving water from Staines. Taking into consideration the normal increase in the Company's rental and the fact that there would no longer be the abnormal increase in the charges for maintenance, or for interest and dividend on fresh capital to be raised, the Directors had come to the conclusion that the time had arrived when some consideration could be shown to the shareholders; and they had authorized him to say that at the meeting next December they would be prepared to recommend a dividend at the rate of 8 per cent. He looked forward to the time when the Company, who had now for five years, on their normal receipts and expenditure, earned a dividend of 9 per cent., would reach the 10 per cent. maximum to which the shareholders were entitled. The only other matter to which he need refer was very fully dealt with in the report—the parliamentary proceedings and the action of the London County Council. Some years since, that body pressed to have a Royal Commission on the Metropolitan Water Supply. It was granted them, and most eminent men constituted it. They came to a conclusion favourable to the Water Companies, and not to the Council. Ever since then that body had called in question the conclusion to which the Commission came. Another Commission were appointed three years ago, consisting of very able men, and presided over by a man of the greatest talent and penetration, who devoted—he could not say how many days, and the full power of his mind, to investigating the subject. That Commission came to a unanimous conclusion; and they no sooner reported it than the County Council went in a diametrically opposite direction. The experience of the Directors therefore was that the more they attended to the Company's work, and the less they troubled themselves about the County Council, except to defend the Company from attack, the better.

Viscount KNUTSFORD, G.C.M.G., seconded the motion.

Mr. BELLEWES expressed the proprietors' indebtedness to the Directors for the skilful way in which they had placed the Company's case before the Royal Commission, and for the triumphant result which had been secured. There were rumours as to proposals for the amalgamation of some of the Water Companies—their own being possibly one of them. He did not know whether the Directors would be prepared to entertain such a proposal; but he felt quite confident that they would not do so unless the full value of the Company's prospective as well as of their actual rights was taken into consideration.

The CHAIRMAN, in reply, said that the shareholders might rely upon it that their interests would not suffer at the Directors' hands.

The motion was carried unanimously, and resolutions were afterwards passed declaring the dividends recommended and re-electing the retiring Directors (Viscount Knutsford, the Hon. Sydney Holland, and Sir John Colomb, M.P.) and Auditor (Mr. R. A. M'Lean).

An extraordinary general meeting was held subsequently.

The CHAIRMAN stated that all matters in connection with the intercommunication scheme had been so frequently referred to that it was unnecessary for him to go into any details. The Grand Junction Company was one of the first who were required to carry out their portion of the works; and it had cost them as nearly as possible £70,000. They had already been of immense service to the East London Company, and might be again this year. Further works in connection with intercommunication would have to be carried out by other Companies. All these matters were under the consideration of the Local Government Board. So far as the Grand Junction Company were concerned, they had made the works and borrowed the money, and they now wished to get it in the permanent form of debenture stock. He concluded by moving the following resolution: "That the sum of £69,744 cash be raised by the creation and issue of sufficient debenture stock for the purpose under the provisions of the Metropolis Water Act, 1899, and of the consent of the Local Government Board given on the 17th of May, 1900; and that the Directors be authorized to issue such stock—to be called 'three per cent. debenture stock'—on such terms and conditions, at such times, and in such manner, consistent with such provisions and consent, as they may deem expedient.

Viscount KNUTSFORD seconded the motion.

The CHAIRMAN said that Mr. Hunter had suggested to him to mention that the interest on this sum, although paid by the Company, was recouped by the other Companies in the proportion of their respective rentals, and that the charge to their own Company was at present very small.

The resolution was carried unanimously.

Dr. LEESON, in proposing a cordial vote of thanks to the Chairman, Directors, and staff, expressed his opinion that had it not been for the scheme of storage which was initiated by Mr. Hunter and the late Mr. Fraser, the Company's position would have been totally different, and their shares would not have been worth half their present value, while the scheme for bringing water from Wales would have been very far advanced.

Mr. LATHBURY seconded the motion, which was carried unanimously.

The CHAIRMAN acknowledged the vote, and the proceedings terminated.

PROFESSOR LEWES AND THE CITY CORPORATION.

At last Thursday's Meeting of the Court of Common Council of the City of London, Mr. A. C. Morton was successful in getting the following resolution passed: "That it be referred to the Officers and Clerks' Committee to consider the conduct of the Gas Examiner in giving evidence before the House of Commons Committees for the Gaslight and Coke Company and the South Metropolitan Gas Company without the consent of the Corporation, as defined by the Court in the terms of his appointment—'To undertake not to act for any Gas Company supplying the City without the consent of the Corporation.'"

It will be remembered that Professor Lewes gave technical evidence as to the luminosity of various flames before Mr. Oldroyd's Committee that sat, with regard to the various Metropolitan Gas Bills, this session—he being summoned to the House by the Speaker's Order to appear and give information. The Chairman of the County Purposes Committee stated this in the Common Council on Thursday; also that he, the Chairman, had wired to Professor Lewes telling him to obey the Speaker's warrant, in reply to the Gas Examiner's request as to what he was to do. In spite of this statement, however, Mr. Morton's resolution was carried.

STATUTORY PRICES FOR PUBLIC LIGHTING IN NORTH AND SOUTH LONDON.

The City Corporation and the South Metropolitan Gas Bill.

It may be remembered that, at the Meeting of the Court of Common Council of the City of London, on the 31st ult. (*ante*, p. 1508), a resolution was passed—"That it be an instruction to the Town Clerk to direct attention of the Local Authorities on the northern side of the River Thames to the South Metropolitan Gas Company's Bill in Parliament, and to request them to present petitions to the House of Lords against the proposal of the Company to purchase the portion of the district of the Gaslight and Coke Company on the southern side of the river, as this proposal, unless the Bill be amended, would have the effect of largely increasing the price of gas to the authorities on the north side of the river beyond the rate fixed by the Amalgamation Scheme of 1883 of the Gaslight and Coke Company and the London Gas Company." Pursuant to the resolution, the following "Memorandum" has been circulated among the Local Authorities referred to in it:—

The Bill is in several separate parts dealing with different objects. Part IV. authorizes the sale to the South Metropolitan Gas Company of that portion of the Gaslight and Coke Company's undertaking which is situated on the south side of the River Thames, if and when the two Companies can mutually agree. The effect of this proposed sale will, if carried out, be to annul the existing statutory provisions under which gas is supplied to public lamps at the lowest rate charged to private consumers south of the river, where gas is the cheapest in London.

Between the years 1859 and 1876 amalgamations of the many Gas Companies who then supplied the Metropolis were authorized by different Acts of Parliament. In the discussions that took place before the Select Committees to whom the Bills were referred, the Corporation, acting in the interests of all the local authorities and private consumers, contended that the fullest protection should be afforded against the establishment of a monopoly, and a consequent increase in the price of gas. The present well-known sliding-scale, and what are known as the auction clauses, were among the provisions inserted with this object.

Under certain Acts, the Gaslight and Coke Company were authorized to acquire the district of the London Gaslight Company south of the Thames; but under those Acts a scheme had first to be prepared and submitted to the Board of Trade for approval. Such a scheme was submitted and approved; and it provides, *inter alia*, for the charges for public lamps.

Shortly, the position with regard to the charge for public lamps is as follows: The Gaslight and Coke Company cannot charge more for public lamps than the lowest charge to private consumers *in any part of their district*. The lowest charge to private consumers in any part of their district is that in their district south of the Thames, which is not to exceed the amount for the time being charged by the South Metropolitan Company, which is the lowest in London; so that the cost of gas for public lamps over the whole district is brought down to that level. If, therefore, the southern district is sold off under Part IV., the lowest charge to private consumers in any part of the Gaslight and Coke Company's district will then be the price charged on the north side; and the cost of public lamps will automatically rise to that level.

To-day, the difference between the Gaslight and Coke Company's charge to private consumers north of the river and the South Metropolitan Company's charge south of the river is 7d., but was, three months ago, 11d. It was given in evidence last session, that the aggregate quantity of gas consumed by public authorities for street lamps on the north side of the river was about 1000 million cubic feet. Upon this quantity, every penny of difference in price amounts to somewhat over £4000. The present difference therefore amounts to nearly £30,000 per annum, in favour of the public authorities. Last year it was nearly £50,000. This difference, or its capitalized value, is, in fact, the value to the public on the north side of the Thames, of the statutory enactments, and is too large a sum to be parted with without some equivalent. Unless Part IV. of the Bill be rejected, or considerably amended, the whole of this will be bargained away between the two Companies.

It is submitted that, in this case (as in the case of all previous gas amalgamations), the terms and conditions of the agreement between the two Companies should be subject to parliamentary criticism and approval in the public interest before being authorized. The Select Committee in the Commons rejected the Bill the Gaslight and Coke Company had introduced to enable them to raise £2,500,000 of debenture stock, because the Bill did not comply with the conditions laid down by Sir James Rankin's Select Committee of last year; but by authorizing (as the South Metropolitan Bill does) the Gaslight and Coke Company to sell their southern district, Parliament is putting an enormous amount of capital at the Company's disposal without a single one of those conditions.

The Bill will be in the House of Lords soon after the Whitsuntide recess; and it is hoped that all the Local Authorities in the Gaslight and Coke Company's area will co-operate with the view of obtaining either the rejection of Part IV. of the Bill altogether—and no urgency is claimed for it—or at all events in obtaining such an amendment as may protect the public from loss. In conclusion, the Corporation ask the co-operation of the various Boards in the matter.

On the receipt of the above communication by the Holborn District Board of Works at their meeting on Monday of last week, it was resolved that the Corporation be informed that the Board would accede to their request.

THE DUBLIN CORPORATION AND THE SUPPLY OF CARBURETTED WATER GAS.

At the Meeting of the Dublin Corporation on Monday last week, a report was presented by the Special Gas Committee with reference to the manufacture and supply of carburetted water gas by the Alliance and Dublin Gas Company. Mr. M'Call, in moving the adoption of the report, said he understood that the Company had put down plant by which they would be enabled to produce 4 million cubic feet of gas per day, which he thought exceeded their present supply by a million feet. In other cities where this gas was used, the quantity was confined to 20 per cent. He suggested that a somewhat similar agreement should be come to here, and that the people should be advised to see that the gas-pipes in their houses were in good condition, and that there were no leakages in them. The City Analyst should also be instructed to make analyses from time to time of the exact proportions of carburetted water gas distributed in the city. Mr. Irwin, in seconding the motion, said they had no power to prevent the manufacture of water gas and its supply to the citizens; but what they claimed was that the percentage of it should be limited. Mr. Murray thought they should be slow to interfere with the Gas Company in this matter. Mr. Joynt expressed the opinion that the Company should be called upon to give a guarantee on the line suggested by the Committee. Alderman Meade thought the House had not sufficient information to enable them to come to a fitting conclusion. The Committee should obtain expert opinion as to this new gas, and also legal advice as to the position of the Council in the matter. For this purpose the report should be referred back to the Committee. Alderman Cotton thought the House would be doing the proper thing in sending the report back for the fullest information. Dublin was about the last city to adopt the use of carburetted water gas. As to the question of labour in the works, its manufacture would make very little difference in the number of men employed. Mr. Clancy said there was great anxiety in the city as to the danger attending the use of this new gas, and Professor Reynolds had stated that, as at present supplied to the citizens, the gas was poisonous, and was a menace to health. The Council must do something to allay this anxiety. There was another view of the matter to be considered, and that was that the labourers at present employed by the Company would be reduced by 80 per cent. Alderman Cotton said the plant now being put down at the gas-works was in duplicate, and was only for the manufacture of 2 million cubic feet per day. It was eventually resolved to instruct the Gas Committee to obtain expert advice and also legal opinion as to their power; and what they advised the Council should do. The Committee were also instructed to ascertain where, and in what proportion, the admixture was used in the United Kingdom and elsewhere.

THE PROPOSED PURCHASE OF THE LEAMINGTON PRIORS GAS-WORKS BY THE CORPORATION.

Rejection by the Company of the Corporation's Offer.

Our readers may remember that, at a Meeting of the Leamington Town Council on the 14th ult., a resolution was passed that an offer should be made to purchase the undertaking of the Leamington Priors Gas Company for the sum of £140,000, and that Mr. Thomas Newbigging should be appointed Arbitrator (*ante*, p. 1390). The exact terms of the resolution were as follows: "That an offer be made to the Gas Company to purchase their undertaking at a sum of £140,000; the Corporation taking over all liabilities (excepting loans of £11,790, which the Company must discharge), and assets, including the surplus revenue of £7394, as per published balance-sheet at Dec. 31, 1899." This resolution was forwarded by the Town Clerk (Mr. H. C. Passman) to Mr. Edward Wright, the Chairman of the Company; and a special meeting was called to consider it. In sending a copy of the resolution to the proprietors, the Secretary (Mr. T. Berridge) stated that he had been instructed by his Directors to say that, in view of the estimate of the value of the works made by Mr. Livesey, who had been called in to advise upon the matter, they did not feel justified in recommending the acceptance of the offer. The meeting was held last Tuesday, when resolutions were passed rejecting the offer, and authorizing the Directors to appoint an Arbitrator, in accordance with the provisions of section 62 of the Leamington Corporation Act, 1896, and the Lands Clauses Acts therein referred to, and to take such steps, by the employment of Counsel, the retention of expert witnesses, and other means, as they deem necessary for protecting the interests of the shareholders, and properly representing their case before the Arbitrators and the Umpire to be appointed in accordance with the above-named Acts.

Sequel to the Brigg Gas-Works Transfer.—In connection with the transfer of the Brigg Gas Company's undertaking to the Brigg Urban District Council, Mr. George Jack, the Manager of the works, claimed as compensation £1721, and Mr. G. Clarke, the Company's Collector, claimed £735. With a view of effecting a compromise, the Council offered Mr. Jack £400, and Mr. Clarke £135. These amounts the claimants, however, declined to accept; and therefore the matter was referred to arbitration—Mr. George Livesey being the Umpire agreed to. The award just received gives Mr. Jack £600, and Mr. Clarke £135. The costs in Mr. Jack's case are to be paid by the Council; while Mr. Clarke has to pay his own expenses.

THE PRICE OF GAS AT LEEDS.

Radical Opposition to an Increase.

At the Meeting of the Leeds City Council last Wednesday, the proposal of the Gas Committee to advance the price of gas gave rise to a warm discussion; the proposition being strongly opposed by the Radical members.

The Lord Mayor (the Right Hon. Alderman Gordon), in the temporary absence of Alderman Lowden, the Chairman of the Gas Committee, moved—"That on and after the 1st of July next the price of gas supplied by the Corporation be as follows: To consumers within the city of Leeds, 2s. 3d. per 1000 cubic feet; to consumers outside the city, 3s. 1d.; and to consumers by means of automatic meters, 2s. 7d. That the resolution of the Council of Oct. 4, 1898, and also the resolution of the Gas Committee of April 17, 1896, on the subject, with the resolution of the Council of May 6, 1896, approving the same, be and the same are hereby varied accordingly."

Mr. Clarke seconded the motion.

Mr. Ratcliffe moved, as an amendment, that the matter be referred back to the Gas Committee. He said it would be a barefaced imposture upon the people of the city if the price were advanced as suggested. So late as the 23rd of April, the Chairman of the Committee had told them that no increase would be necessary. They had still 275,119 tons of coal in stock and on order. This would supply their needs until March next year. Upon what ground were the Gas Committee desirous of raising the figure? It might be said that the purifiers and yardmen had received an advance of wages. This would mean £1000 or £1500. But, on the other hand, the works were receiving 5s. 10d. a ton more for their coke than last year, which alone would give an increased revenue of something like £30,000.

Mr. Brown seconded the amendment. Halifax, he said, had decided for the present not to raise the price of gas, and he could not understand why Leeds was not in such a favourable position, in the matter of gas supply, as that borough.

Mr. Wilson severely criticized what he termed the hollow arguments of Messrs. Ratcliffe and Brown. He supported the proposal to increase the price of gas, but reserved his right of action in regard to automatic meters.

Alderman Lowden (who arrived during the discussion) said the financial statement for the year ended March 25 last, was not so satisfactory as he had anticipated. If his expectations had been realized, he should not have been disposed to ask for as great an advance as was now proposed. Analyzing the accounts for the financial year ended March 25 last, and comparing them with those of the previous year, Alderman Lowden said the profits for 1898-9 were £22,771 11s. 9d.; and for 1899-1900, 14s. 5d. only. The total increased expenditure for the past year was £41,307 11s., and the increased income £18,536 13s. 8d.; a difference of £22,770 17s. 4d. Though the profit was so small, it was satisfactory there was no deficit; and as long as he was Chairman of the Gas Committee, he did not intend to have one, or to sell gas at less than cost price, nor was he disposed to leave his successors with a large deficit. He now asked for an advance in the price of gas; but with regard to automatic meters, he was prepared to accept an amendment that no change should take place. The suggested increase of 1d. would only yield £320, while the cost of alterations in the automatic meters, which numbered 10,000, would be £310, besides requiring six months in which to make them. There was scarcely a town in the country which was not making an advance in the price of gas. The increase in 25 cases was the same as that recommended by the Committee, and in 28 instances it was 6d. It should be borne in mind that last year a reduction of 2d. was made in Leeds at a time when no other town lowered its charges. The present suggested advance, therefore, only meant 1d., as compared with other towns. If it were not for the favourable position of Leeds as regarded coal, an increase of 3d. would not suffice. Alderman Lowden criticized at some length the objections raised by the Radical members to the Committee's proposal, and concluded by stating that in the Gas Department there had been invested capital to the amount of £1,500,000; and it was their duty to see that this money was used in the interests of the city. If the Council wished the department to remain in a proper financial position, they would have to grant the application for the advance in the price of gas.

Mr. T. Walker did not see that they were warranted in assuming that coal would be 5s. per ton higher on the 25th of March next. That being so, they were not justified in raising the price of gas 3d. per 1000 cubic feet in anticipation of what might not happen. Neither in Committee nor in the Council had it been shown that an increase in price was necessary.

Mr. Henry protested that there was no necessity for an advance in the price of gas at present. It was evident that there was sufficient coal for this year, as some 275,000 tons had yet to be delivered; and, in addition, there were the surpluses from month to month. There were consequently nearly 300,000 tons available for the next six months. This being the case, it was not necessary to raise the price of gas. The design was apparent, however. Money was required; and the Conservative majority had pledged themselves that, no matter what the expenditure was, the rates should not be raised—that money should be got in some other way. The proposed advance in the price of gas was merely part of a system of extraction which was absolutely unnecessary.

Mr. Kinder complained that the gas profits were taken, and that the moment money was required by the Gas Department the price of gas was raised. He agreed with Sir Albert Rollit that, in conducting municipal trading concerns, all that was required was to safeguard the ratepayers against loss; but at the same time he held that some regard should be paid to the rights of the gas consumer.

After some further remarks in a similar strain, the amendment was put and lost.

Mr. Jessop then brought forward an amendment to the effect that the price charged for gas to customers using prepayment meters and cookers should not be advanced. This, he urged, would relieve the poorer class of consumers.

This amendment was carried; and eventually the Gas Committee's minutes, as amended in accordance with Mr. Jessop's proposition, were confirmed by 21 votes to 17.

ST. HELENS CORPORATION GAS SUPPLY.

The Past Year's Working and the Progress of the Undertaking.

At the last Monthly Meeting of the St. Helens County Borough Council—Alderman J. L. Gamble (in the absence of the Mayor) in the chair—the minutes of the Gas and Lighting Committee were presented. They set forth that the balance-sheet for the year ended the 31st of March last, showed that a net profit of £8855 had been made; and that the Committee had resolved that such profit should be appropriated as follows: £2500 to the borough fund, or as the Finance Committee might direct; £500 to the borough fund, to be expended in improving the street lighting; and the balance (£5855) to the reserve fund. The Committee further resolved to continue the price of gas, both for lighting and power, as at present.

Alderman Cook, in moving the adoption of the minutes, said that during the past financial year the total quantity of gas produced was 327,332,000 cubic feet, as compared with 298,000,000 cubic feet in 1898-9; being an increase of 9·82 per cent. The quantity of gas sold had been 306,126,000 cubic feet; being 10·47 more than in the previous year. The coin meters passed 51,772,000 cubic feet, against 33,000,000 cubic feet—an increase of 36 per cent. The amount in cash taken from the coin meters was £7135, against £5236. The gas used for motive power was 9,524,000 cubic feet, as compared with 7,487,000 cubic feet in the previous year; being 27 per cent. more. The unaccounted-for gas was 5½ per cent., against 6 per cent. in the previous year. The extra cost of coal during the year had been equal to 2·68d. per 1000 cubic feet. There had been received for residuals and sundries 2·29d. per 1000 cubic feet more than in the previous year. Financially the results were as follows: The gross profits for the year were £21,157, out of which there had been paid for interest and sinking fund £10,718. The depreciation of meters and stoves came to £1564, and there was a new item of £20 for the superannuation account. These sums deducted from the gross profits left a net profit of £8855. Having explained how the Committee proposed to appropriate this amount, he went on to say that the reserve fund stood at £17,119. But there was a debit, or sort of suspended account, against that fund of the amount lost on account of the explosion, £3461; so that if they did not receive any damages, the reserve fund would stand at about £13,658. With regard to the price of gas, the Committee did not purpose raising it. During the year there had been added 621 new consumers; and they had now 7658—being an increase of 8·8 per cent. They had fixed 1056 cooking and heating stoves and boiling burners, as compared with 610 in the previous year. There were erected during the year 23 additional public lamps; making a total of 1637 now in use. As the end of the century was approaching, he had been curious and interested enough to review the accounts of the Gas Department since the undertaking was acquired in 1878. He had done this to see what benefits had accrued to the community of St. Helens by that purchase, as well as to ascertain if the expectations of the Council of that day had been realized by the results. The total quantity of gas sold in 1878 was 99,451,000 cubic feet; the quantity sold last year was 306,126,000 cubic feet—being an increase of 207·8 per cent. The unaccounted-for gas in 1878 amounted to 13·22 per cent.; whereas last year it was 5½ per cent. The net profits which had been realized were £96,101. There had been ten reductions in price, amounting to £22,359; and there had been discounts allowed since 1882 of £36,052. In 1891, meter-rents were abolished; and in 1895, the charges for the hire of cooking and heating stoves. These sums made altogether £163,532, which represented the benefits which had accrued to the whole community of St. Helens by the acquisition of the gas-works. Some few years ago, he had an extract made from the books of the Corporation to see the amount of rates paid by the consumers and the non-consumers of gas. At that time the consumers paid 55·6 per cent. of the rates, and the ratepayers who were not consumers paid 44·4 per cent.; consequently, of whatever was paid into the borough fund out of the gas-works profits, 55·6 per cent. went back again to the consumers in the relief of their rates. This aspect of the question was not often noticed. Dividing the sum of £46,531 paid to the borough fund, he found that the gas consumers received £25,870 back in reduction of rates, and that the ratepayers who were not gas consumers only got back £20,620. To sum up all the benefits that had been conferred upon the gas consumers, there were ten reductions in price, amounting to £22,359; discounts were allowed of £36,052; and meter and stove rents were abolished to the amount of £9020. There was another aspect of the accounts to which he must refer, and that was the soundness of the concern. The capital expenditure in the year 1880 stood at £157,159, and there had been an outlay on capital account since that date of £111,986; making a total of £269,145. There had since been reductions—to the amount of £88,000; so that the balance at the present time was £181,145. It would be well to see how they stood with respect to the quantity of gas made in 1880. The capital then was £157,159, or at the rate of £1 10s. 4d. per 1000 cubic feet of gas. Now the capital expenditure account was £181,145, or 11s. 10d. per 1000 cubic feet—a reduction of 61 per cent. on 1880. He thought he had said sufficient to show that the accounts were very satisfactory, and testified to the sagacity of the Council in 1878, who carried through the negotiations which resulted in the purchase of the gas-works.

Mr. Leach said he thought the thanks of the Council were due to Alderman Cook, Mr. Glover (the Gas Engineer), and the members of the Committee, for the excellent way in which they had managed the gas undertaking. In distributing the profits, £5855 would go to the reserve fund. He thought if the Committee had seen their way to have dealt a little more generously with the rates out of the amount, they would have completed better than they had done their splendid work for the benefit of the town.

Alderman Cook said he thought every Committee, when they were spending money, ought to be perfectly aware of the effect it would have on the rates. It was a bad precedent to apply to his Committee in time of financial difficulty; and he could not agree to make any further grant. If the Council chose to say it should be so, he must submit; but it would be a wrong policy, because coal would cost £5000 more than last year. In view of this, he thought they could not ask him to give more, because it was not improbable they might have to draw upon the reserve fund in future years.

The minutes were passed.

MANCHESTER CORPORATION GAS AND WATER SUPPLY.

Gas-Meter Tests—The New Pipe from Thirlmere—The Water-Closet System.

At the Meeting of the Manchester City Council last Wednesday, one or two matters of special interest in connection with the Gas and Water Departments were discussed.

Alderman Gibson moved the adoption of the Gas Committee's minutes. They included the acceptance of tenders for the construction of a new boiler-house at the Bradford Road works, and for the supply of the coal and cannel required by the department for the ensuing year. It was also recommended, in accordance with the revised estimates agreed to at the previous meeting of the Council, to make an advance of 3d. per 1000 cubic feet in the price of gas, as from the 24th inst.

Mr. Shuttleworth said that a report from the Gas-Meter Testing Office showed that no less than 425 of the gas-meters which had been tested had proved deficient—telling either against the consumer or the Corporation. He also found that some of the meters put under what was called the "double" test had proved from 33 to more than 55 per cent. against the consumer. No wonder the latter protested. He knew very well that the Gas Committee did not want to charge for something they did not supply; but he would like to have an undertaking that in future, when a dispute arose between the consumer and the Committee, the meter should be put under the double test, and justice done.

Alderman Gibson remarked that the Committee were so desirous of having their meters absolutely correct, that they paid 6d. for every one in order to have it tested; and he was rather pleased to hear that there were only 425 deficient out of 125,000. He did not think this was extraordinary. He could assure Mr. Shuttleworth that the Committee were making inquiries as to this special test. They paid 6d. now, and were prepared to pay more if necessary, so that the test should be correct.

The Committee's recommendations were agreed to.

Alderman Sir John Harwood moved the adoption of the report of the Water Committee noticed last week (*ante*, p. 1566), in which the Council were asked to authorize them to take immediate steps in relation to the laying of another pipe from Thirlmere. The report, he thought, told the Council all they wished to know. They had a great luxury, but it would be wrong to suppose they could not exhaust the supply. They had a good service of pure water, and had been indulging its use to excess. If they employed it reasonably, they had enough water for the next 30 or 35 years. He did not advocate selling their water. They must keep Thirlmere as free as they could, as they would want it. The new pipe would bring 10 million gallons more water daily to the city.

Alderman Sir B. T. Leech seconded the motion.

Mr. Fildes proposed, as an amendment, that the report be referred back to the Committee for further consideration; making special reference to a paragraph in which it was stated that there had been a large increase in the number of water-closets, and the question was whether the Committee had such quantity of water at their disposal as to be able to bear this strain. The Committee seemed fearful lest the demand on this account would affect the general supply of the city. The average number of conversions of old property to the water-closet system during the last four years was 674; constructed in new houses, 2412; and in new buildings, 366—making a total of 3452. On a fair and equitable basis, this meant an extra 64,000 gallons per day of water consumed in closets. He asked anybody if there was anything to fear from this amount of increase. Practically all the important cities in England had adopted the water-closet system; and yet the Water Committee wished to restrict the work. They no doubt desired to furnish a good supply to the city; but it seemed passing strange that they should ask the consumers to be careful now because 32 years hence they might be short of water. Let them do their duty to the city now by providing it with water. In 20 years' time there would be another Committee, who would see that the right thing was done under the circumstances. Sir John Harwood and his Committee had no need to look after posterity, which would look after itself.

Mr. Plummer, in seconding the amendment, said he had read the report with considerable surprise; and he could not altogether absolve Sir John Harwood and his Committee from taking up the position of alarmists. It seemed an unheard-of proceeding that, while admitting that they had 75 million gallons of available water, that they had not got to half of it, and that the contingency of possible failure would not arise for 22 or 23 years, the Committee should wish to limit the supply. Previously, when they had come to within measurable distance of the exhaustion of supplies, they rendered homage to the men who saw the difficulty, and remedied it. They were now getting into a state of panic as to a possible failure in the next generation. The same energy which opened up the Thirlmere supply would no doubt be available again when the necessity arose. He hoped members of the Council would agree that they should not be prevented from doing anything necessary for the good of the city because of the contingency of possible failure in the next generation. They had brought water from remote hills in Cumberland; there was another lake not far away; and if any of the Committee were in a state of apprehension, let them at once start and make provision for an increased supply. They were justly proud of the financial management which had brought Thirlmere water to Manchester, not only without putting an additional burden on the city, but enabling them to reduce the price of water. If the contingency feared did arise, by that time one-half of the debt at present existing on the water-works would have been paid off. They had heard nothing from Sir John to justify this report; and he would urge the Council to adopt an uncompromising attitude, and not ask any citizen to stint himself in the reasonable use of water. He hoped the broader view of the Council would prevail over the narrow one of the Committee.

Sir B. T. Leech observed that Mr. Fildes and Mr. Plummer seemed to labour under serious misapprehensions. He did not think the report dealt at all with the question of putting an end to the use of water-closets. It simply drew attention to the fact that a large consumption was going on, and, as sensible people, they must take care there was no waste. That was all it said. It was stated that they were alarming people because they pointed out that in 35 years they would be short of water. He was not an alarmist, but he did say that the consumption of water had increased to an extent which had never been anticipated—one chief cause being that people had the idea that there was

any quantity to be got, and were using it in a way that was not at all desirable. He disliked waste, and he was thoroughly convinced that it was going on to a large extent. Their position was rather serious. They had a pipe from Thirlmere from which they had expected to get 10 million gallons; but they found that a certain proportion of it escaped, and they only had 8½ millions. They had done all they could to deal with this difficulty. The report simply asked the Council to let the Committee go on taking steps to put down a second pipe. He could not conceive—knowing that they were likely to be short of water—that they could get the pipe; and until it was laid they must be careful. What would refuse permission to do this. Some years would pass before they the Committee wanted to do was not to cause alarm, but to point out that if proper care was not exercised there was a possibility that necessity would compel the Committee to curtail the supply. They should not regard the water supply as inexhaustible, but make it last as long as it would.

Alderman Southern observed that the mover and seconder of the amendment were in a state of unnecessary perturbation and alarm. Mr. Fildes imagined that some one was going to propose that the Sanitary Committee should be hampered in their operations with respect to the water-closet system. It would have been better if he had heard what was to be proposed, and then he would have found a great deal of his alarm altogether unnecessary. Mr. Plummer had evidently not studied the diagram showing the increase which had taken place in the consumption. The amount consumed had reached 32,439,893 gallons per day. They had thought they could rely on 25,000,000 gallons from Longdendale, and 10,000,000 gallons from Thirlmere; but, whether owing to leakage or not it was difficult to say, they did not get the anticipated amount. They were nearing to the limit of the available supply, and they must exercise caution. Sir John Harwoood, showing the same foresight which he had exercised before, called attention to the fact that they were getting nearly up to the full supply of the present pipes. It would take three years to put down another pipe. In the meantime, what was going on? With regard to water-closets, the consumption was 2,260,850 gallons per day, and they had 49,439 of these closets. There was a rapid increase in the supply of water to meet these changes. He did not want to stop the Sanitary or Buildings Committee in introducing water-closets where they could, but if they could, with equal advantage, apply pail closets, they should do so. He hoped the Council would adopt the report as it stood.

Mr. Simpson supported the amendment, on the ground that the paragraph in the report to which reference had been made was alarmist, and that the remedy suggested or implied was one which ought to be the last to be considered.

Sir John Harwood remarked that those who had been opposing the report were the very people who he should have thought would support the policy of the Committee. The Committee said their descendants would be in a dilemma if care were not exercised now. Those who opposed the report said: "Don't regard it at all." He might further remark that it could not be proved that there had been any diminution in the death-rate where water-closets had been established. They could, however, discuss the other parts of the report as long as they pleased, so long as they gave the Committee the power they sought to lay the extra pipe. He personally had no objection to dropping the paragraph about the water-closets, so long as the Council passed the recommendation about the new pipe.

Ultimately the report was adopted in accordance with Sir John Harwood's suggestion as to the withdrawal of the paragraph respecting the water-closet system.

THE PRICE OF GAS AND WATER AT BRADFORD.

At the Meeting of the Bradford City Council last Tuesday, the prices charged for gas and water were under consideration.

The minutes presented by the Gas Committee contained a resolution that, in view of the increased cost of coal, the price of gas be advanced from the 1st of July next, from 2s. 3d. to 2s. 6d. per 1000 cubic feet; also the resolution of a Sub-Committee "that the gas discounts at present in force be continued, but that the account for each separate property owner or occupier, be kept and reckoned separately, with the proviso that the grouping of accounts for gas supplied to cottages or dwelling-houses, with accounts for gas supplied to business premises, be prohibited." The latter resolution was afterwards rescinded by the General Committee. Alderman W. E. Aykroyd, Chairman of the Committee, in moving the adoption of the minutes, stated, in reference to the proposed increase in the price of gas, that the extra cost of the coal required in the year ending March 31, 1901, was estimated at £36,000. This sum would have been £10,000 more if the Committee were not receiving 40,000 tons on last year's contracts. The prices of all materials and the rates of wages had gone up; so that repair and maintenance of works would this year cost about £8000 more than last. The alteration of the public lamps for the incandescent system would cost nearly £7000; while the cost of the public lighting in the recently added districts would be £4800. The reduction in the price of gas in North Bierley would cost £2700. Altogether, the additional expenditure for the year was estimated at £58,000; while the increased revenue due to better prices for coke and residuals was estimated to produce only £16,000—leaving a difference against the Committee of £42,000. The profit last year was £20,500; so that unless the price of gas was advanced, or the Committee were paid something towards the cost of street lighting, which this year would come to £29,000, there would be an actual loss of £21,500. The unappropriated gas profits on the 1st of April were £39,700. An advance of 3d. per 1000 cubic feet in the price of gas would produce £18,000; leaving a deficit of £3000, which would have to come out of the profits. Mr. S. Smith drew attention to the question of gas discounts, on which the Committee had withdrawn a resolution. On one account, the total income was £152 11s. 11d., and the discount allowed was £19 1s. 6d. The number of accounts included in that amount which ought to have no discount according to the scale was 200. The number of accounts represented was 233. They were lumped together, and it was looked upon as a wholesale order. Another account—as to public-houses—was for £126 8s. 1d. The discount allowed was £15 16s. The number of accounts in this name which ought to have no discount was 60; those which should have 2½ per cent. 24, and only one should have 5 per cent. There were 85 meters represented, and not one of them ought to have 7½, 10, or 12½ per cent. The minutes were passed.

The Chairman of the Water Committee (Alderman Holdsworth) moved the adoption of the minutes of that body. At a meeting of the Contracts and Works Sub-Committee held on the 23rd ult., a deputation from the Woolcombers' Association attended, in reference to the proposal to increase the charge for water when more than 400,000 gallons were taken, and urged that the price should not be increased, as it would, in their opinion, have a tendency to make consumers search for other means of supply, and thus reduce the quantity of water required from the Corporation. The Sub-Committee discussed the subject, and resolved to recommend that the same charges as at present be continued up to 400,000 gallons, and that above this quantity the rate be 7½d. per 1000 gallons. Alderman Holdsworth, in moving the adoption of the minutes, referred to the increased charge for water supplied for trade purposes, and said that for a great many years the trades of Bradford using water in large quantities had been receiving it very much under cost price. This could not continue. The Committee had been put to enormous expense to keep pace with the consumption of water, and the works had been carried on at a loss for years past. There was also no probability of the Committee being able to get assistance from the Gas Committee. In view of these facts, they had felt it necessary that the advance in the price of water should be made. The revenue from water-works sources had been very elastic. It was continually increasing; but the expenditure was also continually increasing. Taking the revenue of the last fourteen or fifteen years, there had been a continual loss of £10,000 or £11,000 per annum. The advance in the price of water was, he admitted, a serious step to take. For his own part, he did not desire to raise the price to the large consumers; but the Committee must have money to enable them to pay their way, and the only remedy was to put the charge upon the people who, as a matter of commercial fairness, ought to bear it. The demands upon the high-level service were now just double the real storage capacity of the high-level reservoirs, and but for the assistance of the new conduit the Committee would have been in a far less advantageous position. It was only honest and fair that those who received the water should pay for it at its commercial value. There was no profit upon it even at the increased price to be charged, nor did it pay anything for interest or sinking fund on the new works. Alderman D. Milner seconded the motion. Alderman Hustler moved, as an amendment, that the minutes be adopted with the exception of the resolution advancing the price of water to large consumers, and that this be referred back for further consideration. He contended that it was very unfair to raise the price of water. In Leeds, Batley, Dewsbury, and Halifax the price charged for trade purposes and for supplies in large quantities was less than in Bradford. Mr. J. Triffitt seconded the amendment. Mr. E. R. Hartley said the large consumers, who were now getting supplies of water at less than cost price, were chiefly responsible for the fact that Bradford was spending £1,500,000 for new works in the Nidd Valley; and yet they threatened that, unless they were still allowed to have their water below cost, they would make that expenditure useless. Alderman Holdsworth contended that it was not fair to compare the cost of Bradford water with that of some other towns which had been more fortunately situated, either in being in close proximity to large drainage areas, or in not having to supply water of the peculiar quality required by the Bradford trade. The amendment was lost by 41 votes to 26; and the minutes were then passed.

WIGAN CORPORATION GAS SUPPLY.

The Past Year's Working.

The Engineer and Manager of the Wigan Corporation Gas Department (Mr. Joseph Timmins) has lately presented his thirteenth annual report, dealing with the twelve months ending the 31st of March last. After specifying the nature of the extensions made to the works and plant, which included the renewal of two sections of retorts (56 mouthpieces), the erection of two new purifiers, each 30 ft. by 20 ft., and 5 ft. 6 in. deep, and the lengthening of the mains by 2 miles 126 yards, Mr. Timmins says the increase in the number of consumers in the year was 667, and of gas cooking-stoves 86. The quantity of coal and cannel carbonized was 32,462 tons, against 30,319 tons in 1898-9—an increase of 2143 tons, or 7·06 per cent.; of gas made, 369,465,000 cubic feet, against 353,964,000 cubic feet, a rise of 15,501,000 cubic feet, or 4·38 per cent.; of gas sold, 343,809,300 cubic feet, against 327,267,300 cubic feet, being 16,542,000 cubic feet, or 5·05 per cent. The gross and net profits for the year 1898-9 were £26,889 and £13,258; whereas for the past year they were £27,987 and £14,078. The total amount of net profit for the past thirteen years is £124,599. Mr. Timmins calls the attention of his Committee to the fact that practically the whole of this has been handed over to the district fund, and applied in relief of the rates, without any very clear definition of the source of application. He therefore ventures to suggest that the Committee should take into their consideration the desirability of supplying gas for "public lighting" free; new pillars, brackets, and lamps, and the maintenance of those existing, to be made a charge against the Streets Committee. The public lighting has for a number of years been done practically free of charge, as, whether the cost of doing so was made a first or a second charge against the amount handed over to the district fund out of the gas profits, the final result was precisely the same, though indirect in the channel through which it was passed, and indefinite in its issue. Mr. Timmins expresses the hope that the Committee may see the desirability of determining a clearly defined application of at least a portion of the profits made by this department as suggested.

Accompanying Mr. Timmins's report is an abstract of the accounts of the Gas Department for the past two years. It shows that the receipts from the sale of gas, residual products, fittings, &c., amounted last year to £66,322, and the expenditure to £38,335, as compared with £60,043 and £33,154 in 1898-9. The balance is now £27,987; whereas last year it was £26,889. The amount brought forward is £14,271, making a total of £42,258; last year it was £11,313, making £38,202. From the £48,258 there has been paid interest amounting to £9564; placed to the sinking fund, £4245; to the general district fund, £12,500; and to the bad debts

account, £99—leaving a balance of £15,850 to be carried forward. Out of the amount available last year after payment of interest (£28,834), £10,300 was placed to the general district fund; and the balance carried forward was £14,271. The total capital expended on the works up to the close of the past financial year was £340,136, of which £4895 was laid out in the preceding twelve months.

The foregoing accounts came before the Borough Council at their last meeting. In moving the adoption of the Gas Committee's minutes, Alderman Holmes referred with satisfaction to the increase in the quantity of gas sold, which, he pointed out, amounted to 5 per cent. The profits were £820 more than they had ever been before, and represented on the gross capital invested in the undertaking a little more than 4 per cent. He looked with no little trepidation at the prospect of a very serious increase in the price of coal during the current year; for should the advance of 5s. a ton, which had been accepted by many railway companies and gas-supplying corporations, be demanded from the Wigan Corporation, there would be a reduction of something like £8000 in the profits of the undertaking. The minutes were passed.

BURY CORPORATION GAS SUPPLY.

The Past Year's Working.

At the last Meeting of the Bury Town Council, the minutes presented by the Gas Committee contained the annual report of the Engineer and Manager (Mr. H. Simmonds), covering the period ending the 31st of March last. He stated therein that the quantity of gas made was 355,646,000 cubic feet (229,000 cubic feet having been made from benzol), and that sold and used on the works 349,088,150 cubic feet; leaving 6,557,850 cubic feet unaccounted for, or 1·87 per cent. In the preceding year, the loss was 7,434,750 cubic feet, or equal to 2·2 per cent. The cost of manufacture, distribution, management, &c., per 1000 cubic feet of gas sold was 2s. 1·35d. Allowing for tar, sulphate, coke, sundries, 10·02d., the net cost was 1s. 3·33d. Adding interest on loans, stock, and sinking fund, 6·45d., the total cost was 1s. 9·78d. The income being 2s. 3·15d., the profit (£7675) was 5·37d. The estimated cost for the current year is: Total gross cost per 1000 cubic feet of gas sold, 2s. 6·27d.; less residuals, 10·79d.; net cost of gas, 1s. 7·48d.; add interest on loans, 6·33d.; total cost of gas, 2s. 1·81d. Revenue, 2s. 3·48d.; estimated profit (£2300), 1·67d. There was an increase of 30 stoves and 269 grillers, 97 prepayment meters, and 477 new meters during the year; and the total length of mains in use at its close was 77 miles 690 yards. Alderman Collinge, in moving the confirmation of the minutes, called attention to the Manager's report, from which he said it would be seen that there was a profit of £7675. The Committee proposed to divide this sum—one moiety going to the general district rate, the other to the consumer. Last year they charged for gas 2s. 3d. per 1000 cubic feet, less 1d. for prompt payment, which, with 2d. from the profits (which was also deducted), brought the cost down to 2s. Now they proposed to charge 2s. 4d., less 1d. for prompt payment and 3d. profit; so that it came to 2s., as before. They all knew that there had been a great advance in the price of coal, which had cost about £3000 more than they thought it would do; and they anticipated it would cost them several thousand pounds additional during the current year. This was the reason why they put up the price from 2s. 3d. to 2s. 4d. The minutes were passed.

ROCHDALE CORPORATION GAS AND WATER SUPPLY.

According to the recently issued annual report of the Gas Committee of the Rochdale Corporation, there was an increase of 6¼ per cent. in the consumption of gas in the twelve months covered by it; while the revenue from residual products showed a still more marked advance—being 69·7 per cent. of the cost of coal, as against 50·5 per cent. in the previous year. The use of gas for purposes other than lighting steadily extends; the quantity so used last year amounting to about 83 million cubic feet—an increase of nearly 19 per cent. Prepayment meters increased in numbers during the year; but the income per meter was rather less than before, and scarcely provided an adequate return on the outlay incurred. The balance of net profit at the close of the year, after strengthening the reserve fund by the addition of £6000, instead of the usual contribution of £3000, amounted to £13,061. Owing to the rise in the cost of coal, the Committee notified that the question of raising the price of gas must early engage attention. At the meeting of the Town Council on the 7th inst., the Committee brought up a resolution they had passed on the previous day, recommending the Council to order that after the next quarterly inspection of meters the price of all the gas supplied within or beyond the borough should be raised 3d. per 1000 cubic feet, and that the consumers using prepayment meters be charged 1d. for each 20 feet of gas supplied to them. It was explained that the Engineer and Manager (Mr. T. Banbury Ball) had stated that the probable increase in the Committee's expenditure this year was £14,250, £12,000 being for coal. The gross profits last year were £19.060, and the 3d. increase would realize £4750; making a total of £23,810. Deducting the extra expenditure which had to be met, there was left a profit of £9560, which was the sum the Manager thought they might fairly look forward to, independently of any increase in the consumption of gas. The resolution was confirmed.

The Water Committee have also issued their annual report. It shows that during the past year there was an increase of 570 in the number of tenants; the total being 28,390 for 1899-1900, against 27,820 for 1898-99. The ordinary water-rental payments now amount to £27,257, against £26,696 twelve months ago; showing an increase of £561. Payments for supplies by meter total up to £7307, against £6688 in 1898-99—an increase of £619. The total increase for the year is therefore £1180. These amounts do not include the rentals for water supplied from the Ramsden Woods reservoir and works recently acquired from the Todmorden Water Company, which are as follows: Domestic water-rentals, 1900, £1429; supplies per meter, £522—total £1951. The Committee say the above figures show that the demand for water in the town and districts require the supply available from the Ramsden Wood reservoir to be at once connected with the present service.

SALE OF THE CRAWLEY GAS-WORKS.

In accordance with the announcement which had appeared in the "JOURNAL," Mr. Alfred Richards carried out last Tuesday the instructions he had received from the Crawley Gas Company, Limited, and offered for sale, at the Mart, Tokenhouse Yard, E.C., the Company's freehold gas-works, which stand about half a mile from Crawley Station, on the London, Brighton, and South Coast Railway. They comprise a retort-house, containing in one arch three 21 inch by 15 inch retorts, 8 ft. 3 in. long; in a second arch six 16-inch round retorts 9 feet long—a third arch affording space for two additional retorts; a brick-built and slated coal-store; a vertical condenser and a scrubber, a tar well, with hand pump; a brick-built and slated purifier-house, containing two purifiers, each 7 feet square by 4 feet deep, with lime-shed adjacent; two gasholders, one 48 feet diameter and 12 feet deep, the other 26 feet diameter and 10 feet deep, both in brick and puddle tanks; a 250-light station meter, and a 6-inch governor and connections; a Manager's house, containing three bed-rooms, sitting-room, and washhouse; a lean-to workshop adjoining, fitted with bench, &c.; and an open store about 20 feet long and 12 feet wide. Mains to a total length of about 3½ miles have been laid in, and there are about 160 house services and meters, and 78 street-lamps and columns, belonging to the Company. The output of gas in 1899 amounted to 5,678,600 cubic feet; and the price charged to ordinary consumers was 4s. 9d. per 1000 cubic feet. The districts at present supplied by the Company are Crawley and that part of the parish of Ifield which is situate in Crawley, which together possess a total population of about 3000. There was a good deal of competition for the property, and the biddings, which started at £3000, eventually reached £5000, at which it was sold. The buyer enters into possession on the completion of the purchase on the 29th of September next. All fittings, tools, stock, &c., were included in the sale, with the exception of the coal, coke, and tar, which the purchaser will take at a valuation.

THE WHITWICK AND COALVILLE GAS-WORKS ARBITRATION

At last Tuesday's Meeting of the Coalville Urban District Council, the Chairman (Mr. T. H. Heward) referred to the recently published award in the arbitration in connection with the acquiring of the gas-works, and thanked the members of the Council for the confidence they had reposed in the Gas Committee. He briefly reviewed the negotiations which led to the decision to abide by arbitration. At a conference held with representatives of the Company, they made an offer of £30,000; but were told that the representatives of the Company had not been empowered to accept less than £42,500, and the matter was referred to arbitration. After hearing the whole of the evidence, the Arbitrators had failed to agree; and therefore the award was made absolutely by the Umpire, who had heard the whole of the evidence. Their Engineer's estimate, as put before the Arbitrators, amounted to £22,911. The decision arrived at amounted to practically £35,000, as the purchase price of the gas undertaking, which amount, with other details, would be increased to £40,000. He thought that, under the circumstances, they had done as well as could be expected, and as well as other urban authorities who had been compelled to purchase gas-works. In the face of the increase in the price of coal, however, the Council would not be able to begin its career in the control of the gas undertaking by reducing the price of gas. The arbitration with reference to the compensation to officers of the Company resulted in claims of £2709 being reduced to £600. Mr. Lindley supported the Chairman's statement; and Mr. M'Carthy said that, although no immediate benefits might result from the acquiring of the gas-works, there was no doubt the benefit would be felt in future years. Mr. W. Sheffield also expressed satisfaction at the result of the arbitration, and thought the ratepayers ought to be satisfied with the Council's effort.

BURTON-ON-TRENT GAS AND ELECTRICITY SUPPLY.

The Past Year's Working—The Price of Gas.

At the Meeting of the Burton-on-Trent Town Council last Wednesday, the minutes presented by the Gas and Electric Light Committee contained particulars of the working of their undertakings (of which Mr. F. L. Ramsden is Manager and Engineer) in the year ending the 31st of March last. In moving the adoption of the minutes, Alderman Lowe, after referring to the increased price of coal, which is now 5s. per ton more than it was twelve months ago, said he thought the Council would agree that they had made substantial progress during the past year in their electric light undertaking; and he ventured to hope the time was not far distant when the department would not only cease to be a charge on the rates of the borough, but would become remunerative. He was glad to inform the Council that the sales had increased in the past twelve months from £2751 14s. 9d. to £3503 3s. 8d. The total receipts were £3732 10s. 6d., against £2851 4s. 8d., or an advance of nearly 33 per cent. He could not but regard this as highly satisfactory; and should they increase in anything like the same proportion during the current year, the Committee would not find it necessary to ask the Council for assistance in discharging their liabilities. The expenditure had remained nearly stationary; amounting to £3738, as against £3621 3s. 10d. in 1899—an increase of £116 16s. 2d. Of this amount, £172 2s. 7d. was for interest on an overdraft at the bank. After paying £1867 13s. 1d. in stock and dividend contributions, they had a deficiency of only £5 9s. 6d. to meet. He felt sure the Council would regard as most gratifying the progress thus made. It was only fair to remind the Council that they had spent £1825 in replacing the old rubber mains with new cables. This had cost them altogether £2359, and had been paid for out of the reserve fund of the gas undertaking. Turning to the gas-works, the Committee were glad to be able to report another successful year's operations. Their business had maintained that steady increase which it had shown during the past. Their sales during the year had increased from £29,786 to £32,322; being equal to an advance of more than 8½ per cent. They had, however, to set against this the increased cost of coal, stokers' wages, and other items involved in the manufacture of gas, which augmented the expenditure

by £4012, in addition to which they had a very heavy year in renewals and repairs to works, plant, and mains, and other establishment charges. They had, however, succeeded in increasing their profit from £6105 to £6521. It was only about three years since the first prepayment meter was fixed in Burton; but now they had no fewer than 1500 of this class of customers, and they were increasing every day. It was a very striking fact that 25 per cent. of the gas consumers preferred this meter to the ordinary one. Then, in addition to the small grillers provided with the prepayment meters, they had nearly 800 gas-stoves out on hire, and had also supplied 90 gas-engines in the town. Perhaps the most noticeable fact about the year's trading was the extraordinary advance in the price of coke, for which the Committee had no difficulty in getting prices varying from 16s. 8d. to 19s. 2d. per ton. This was an advance of 6s. per ton on the average obtained last year. How long these high figures would be maintained, it was impossible to say; but at present the demand exceeded the supply. Taking all things into consideration, the Committee thought the gas and electric light undertakings had worked most satisfactorily. The minutes were passed.

Subsequently, Mr. Lowe brought forward a motion to increase the price of gas 5d. per 1000 cubic feet. He acknowledged that such a proposal was unpopular, and said the Committee had been most reluctant to come to the conclusion that they were bound to take the course they had done. But either the charge for gas must be raised considerably, or they would fail to make any contribution to the rates, which would in consequence go up 6d. in the pound at the very least. They hoped and believed that the rise would be only temporary. They had paid an advance of 5s. per ton on their coal, or equal to 43 per cent. rise. They carbonized 35,000 tons annually, on which they were paying the extra 5s. per ton, which would involve them in an additional expense of £8750; this being the amount they had to provide for. Now, 1d. per 1000 cubic feet of gas was estimated to produce about £1250; therefore an advance of 5d. should bring in £6250, leaving £2500 to be met by the increased price of residuals. It was not proposed to increase the price to prepayment meter consumers. After all 3s. was not a high price for gas, under the circumstances. When the charge was raised in 1894 from 2s. 9d. to 3s., the price paid for coal was 13s. per ton. Now they were entering into contracts at an average price of 16s. 8d. per ton, or 3s. 8d. more than it was six years ago, when gas was at a similar price. There was one other way in which the Committee might have partly met the difficulty, and that was by trying to reduce the illuminating power of the gas. For many years this had been equal to 18 candles, which was higher than many towns, and considerably higher than London; and 16-candle gas, though it would cost less to manufacture, would be just as efficient for power and heating purposes. Though the time might come when this would again have to be considered, the Committee were of the opinion that it was better to keep the quality as at present than to reduce its brilliancy. Mr. Hutchinson contended that, as the price of electricity was not to be raised, the consumer of this illuminant had an unfair advantage over his neighbour who used gas. Moreover, the Committee proposed to tax the gas consumers for the benefit of the general public; and he did not consider this was a proper course to pursue. He moved an amendment to the effect that the increase should be only 2d. all round. After some discussion, in the course of which the Mayor (Mr. G. L. Blackhall) supported the Committee's proposition, the amendment was lost by 16 votes to 3; and the motion was then put, and declared carried.

LOUGHBOROUGH CORPORATION GAS SUPPLY.

The Outlook for the First Year's Trading.

At the Meeting of the Loughborough Town Council yesterday week, the Parliamentary Committee reported that various matters, in regard to which it was necessary to make arrangements for the carrying on of the gas undertaking after it becomes vested in the Corporation on the 30th inst. have been under their consideration. The Committee have decided to recommend the Council to continue the services of Mr. Edward Onions as Engineer and Manager, at the salary now paid by the Company, the amount of salary attached to the office to be reconsidered after twelve months' service. With respect to the provision of additional carbonizing plant, the Committee have approved of the Company undertaking the erection of two additional benches of retorts at the gas-works, and for that purpose to accept the tender of Messrs. Gibbons Bros., for the sum of £1547. The Committee have considered the question as to how applications for additional gas-mains or extensions of mains should be dealt with. A number of such applications have already been received. They have decided to continue the policy of the Company—namely, to make such extensions only in cases where, in the opinion of the Committee, they will become remunerative in the immediate future. The Company have been requested to enter into contracts for the supply of coal and lime required at the gas-works for the next twelve months. The Manager of the gas-works has reported that the average price per ton for coal on the tenders accepted is 18s. 4d., compared with 13s. 4d. last year; and he estimates that the increase in the cost of coal for the year would amount to £2750, lime to £70, and wages £213—total increase in the working expenditure £3033. On the other side, he estimates that there will be an increase of receipts from coke sold of £896; and a saving on other items of £200. So that it would be necessary to increase the price of gas 6d. per 1000 cubic feet to meet the deficiency. The Committee, acting on this advice, "have been reluctantly compelled to direct that the price of gas be increased 6d. per 1000 feet, and have ordered notices to be given for this purpose."

Alderman Bumpus, in proposing the adoption of the report, said this was the first report since the Committee had been occupied in the preliminary stages of taking over the gas-works; and it showed the chief points they had had to deal with. It was absolutely necessary that the plant should be extended, inasmuch as the Manager was unable to guarantee an adequate supply of gas during the coming winter. Had the Company remained in charge of the undertaking, they would some time ago have extended the plant. It was with reluctance that they increased the heavy capital charge; but the rapid increase in gas consumption (the satisfactory factor in the situation) had made compulsory some further capital expenditure. The principal point in the report was the decision to raise the price of gas 6d. per 1000 cubic feet. This certainly was an unfortunate step just as the gas-works were being taken over by the Town Council. But if the Company had remained in charge, they would have had to take the same step. The 6d. increase would only barely cover the actual increased cost of production; and the Company might also have charged a profit upon the increased cost of production. The rise in the price of coal was the cause of the increase. The price of gas had been raised in other towns; and in none less than 6d., except in cases where the gas-works were owned by the Municipalities, and where large surplus profits had hitherto been given in relief of the rates. In such instances, where the increase had been less than 6d. there had been a diminished surplus to hand over for the benefit of the rates. Loughborough had no reserve of this kind to fall back upon; and consequently they had to raise the price of gas to meet the increased cost of production. Speaking generally, he was afraid the financial outlook was not very favourable. Their charges on capital account for the next five years would be exceptionally heavy; and it would only be by an increased consumption of gas that they could hope to equalize their balance-sheet. If the present rate of consumption continued during the next few years, it would put a satisfactory aspect on their accounts. Although for the present the gas undertaking would be expensive and burdensome, he was sanguine that before very long it would be beneficial to the ratepayers. There was one other item that interested some people a good deal; and that was the course the Committee had resolved to take in respect of new streets. They had to look at the gas-works as a commercial undertaking on behalf of the ratepayers. They had, therefore, decided to continue the policy of the Company, and only lay down mains where in their judgment they would prove remunerative. On the other hand, the Committee were anxious to meet the convenience of those who were developing building land, and of would-be consumers of gas in unfinished streets, and also the Highway and Estates Committee, so that streets should not be unnecessarily broken up for the laying of mains. They would give developers of building land an opportunity of ensuring a remunerative return, by offering to receive a guarantee from such developers that for a period of five years the income from the gas consumed through the laying of mains should not be less than 5 per cent. on the outlay. That would enable those who were projecting new streets to have mains laid forthwith. It would be an advantage in the development of the land, consumers would be able to have the gas at once, and it would enable the Highway Committee to be set at rest, inasmuch as they would see their streets more reasonably treated than they had been in the past by the mains being put down before the surface was finished. The Gas Company would be in possession till the 30th inst.; but they had allowed the Committee to proceed with the extension of the plant before they actually entered into possession. Otherwise they would not be able to get the work completed before the stress of the winter consumption came upon them.

Alderman Tidd, seconding the motion, thought the statement made by Alderman Bumpus was satisfactory to all parties concerned.

The report was adopted.

ELECTRIC LIGHTING NOTES.

The Electricity Committee of the Manchester City Council have written to the Local Government Board asking for an early inquiry to be held as to the borrowing of £189,890 for electricity purposes.

At the monthly meeting of the Whitby District Council last Tuesday, the Clerk read a letter from the Local Government Board to the effect that they had decided to accede to the Council's application for sanction to borrow £26,000 for the purposes of electric lighting; and they enclosed their formal sanction.

The financial statement of the Electric Lighting Committee of the Morecambe District Council, just issued, shows that the gross profits on the revenue account this year are £1764, against £775 last year. The total cost of the works and plant is £39,700; and the amount of principal repaid is £2500. The current sold during the year amounted to £3900, as compared with £1800 last year.

The Lighting Committee of the Leeds Corporation intend making application to the Local Government Board for sanction to borrow a further sum of £27,573 for electricity purposes. At the Council meeting last Wednesday, sanction was given to the formation of a reserve fund, to be called the electric lighting equalizing fund; and the payment into it of £8287 from the surplus profit of the electric lighting undertaking was ordered.

The Local Government Board have approved of the scheme for lighting Rhyl by electricity. The scheme will entail an expenditure in the first instance of £19,000, and will be worked in conjunction with a refuse destructor and a new electric tramway along the sea-front. In 1892 the Town Council purchased the gas and water undertakings, but, owing to the rapid development of the town, it has been considered advisable to instal the electric light. The loan is granted for 25 years.

The Lighting Committee of the Wolverhampton Corporation have issued their report for the year ending the 31st of March last. The net result is that, after payment of interest and sinking-fund charges, there is a profit of £402. In addition to this, the sum of £911 was expended during the year out of revenue, to suit the increased pressure at which the current is now being supplied. The amount in hand on account of the working of previous years is £416; and it is proposed to add the profit made last year—making £818—and to set aside this amount to form a reserve fund.

The Electricity Committee reported to the Newport County Council last Tuesday that a surplus of £403 had been made during the past year on the electricity undertaking. Mr. Llewellyn, the Chairman of the Committee, explained that the gross profit during the year amounted to £4092; and that provision had been made for all loans sanctioned, but not for the new ones. He hoped this small profit was an indication and a beginning of better times. Several gentlemen followed with a suggestion that the opportunity afforded by the Gas Company raising their prices should be taken the greatest advantage of, and that at the earliest opportunity the price of electricity should be reduced from 6d. to 4d. per unit. Alderman Moses hoped the Council would not be too hasty in reducing the price; and Mr. White followed with the observation that

comparatively few ratepayers used electricity, while the general body of the townspeople had had to contribute their share towards the cost of the installation.

At a meeting of the Halifax Board of Guardians, held last Wednesday, Mr. R. Thornton presented a report comparing the respective cost of gas and electric light. For the quarter ending March last the cost of gas was £37 12s. 5d., and of electric light £151 2s. 2d.—together £188 14s. 7d. The cost of gas in the corresponding quarter last year was £100 11s. 11d.; showing that, owing to the installation of the electric light, the quarter's lighting bill had increased by £88 2s. 8d. Mr. J. W. Hodgson said that when the installation was decided upon, the Committee were of opinion that there would be a considerable saving of painting, cleaning, &c.; and they were looking forward to a saving there. Moreover, the whole of the premises were more healthy. They ought not to look at the question solely from the pounds, shillings, and pence point of view. In reply to a question, he said that, unless the Halifax Corporation dealt with them liberally, they would at once consider the question of starting electric lighting plant of their own.

An inquiry was held last week at Wolverhampton into the deaths of Samuel Clulow and Daniel Trawford, who died on the 31st ult. from the effects of an electric shock received at the Mars Iron-Works, Ettingshall. A witness named Meredith stated that on the night of the accident he noticed Clulow lying on his back in the weighing-cabin, his left hand being in contact with a wire used for raising and lowering an arc lamp. When witness went to his assistance, his hand touched the wire, and he received a shock. Another witness stated that he saw the two men lying in the cabin. He caught hold of Clulow, and received a shock which drew his arms up. Mr. W. J. Baker, in the employ of the owners of the works, deposed to installing the electric light in November last. The lamps were second-hand, and all the repairs he did himself. He could not explain how the current got down the wire touched by deceased. He had had no special electrical training, and what he knew he had learned from books and by serving with an electrical engineer. Mr. W. H. Thornbury, Consulting Electrical Engineer, of Birmingham, said the wire was no part of the electrical system, and ought to have been completely isolated. He thought that at the time of the accident there was electrical connection between the lamp and the pulley-wire, which thus became a "live" wire; and if there was a leakage of electricity to earth at a distant part of the system a man standing on the ground, and touching the pulley-wire, would receive a shock. When the tests were made, no such leakage could be discovered; but he thought that at the time of the accident there was a leakage from another lamp through a suspension wire to the earth some distance away. He recommended that the plant be reconstructed for a low-voltage system; but with the exception of the electrical connection between the lamp and the suspending wire, there was nothing wrong with the plant. The Jury found that deceased met their deaths from an electric shock, accidentally received, and recommended that a low-voltage system be introduced into the works, or that suspension wires should be out of reach. It was stated on behalf of the owners of the works that the suggestion should have attention, and that all claims for compensation would be satisfied.

THE ABORTIVE NEWHAVEN AND SEAFORD WATER BILLS.

The Effect on the General District Rate.

Yesterday week at the Meeting of the Seaford Urban District Council, the General Purposes Committee reported that a letter had been received from the Local Government Board stating that they had no power to authorize the Council to temporarily appropriate the money now invested in Consols for the purpose of defraying the expenses incurred in promoting and opposing Water Bills in Parliament. They had also received a letter from their Solicitor, enclosing the amount of the taxed bill of costs for promoting and opposing the Bills. The amount payable by the Council was £2435 7s. 2d.; and the Solicitor requested the Council to make some definite arrangement as to the time of payment, and to pay interest on the payments. The Committee recommended that he be informed that the Council will arrange to pay half the amount on or before Sept. 30 next, and the balance within six months of that date; but that they had no power under the Public Health Act, 1875, to pay interest thereon.

It was subsequently proposed that the Chairman be empowered to affix the seal to a general district rate of 1s. 6d. in the pound. The mover of the resolution remarked that, as the Council were aware, they were unfortunately bound to pay the expenses incurred in connection with the Water Bills out of special rates. They might borrow money for the purchase of apparatus to clean out sewers or for the purchase of any "tiny pokey thing," they might borrow to develop landowners' property by providing main drainage, &c., thereby adding increased value to all the sites abutting on the main drain; but they must not do anything for the benefit of the town out of a loan. They were allowed to sink any amount of money on sea-walls and those sort of things; but they could not spend money on anything that would bring a quick return to the ratepayers, to relieve their burdens in the near future as well as give them a pure supply of water. He thought it was a scandal that the law remained as it was at present. They were recommended to go forward with these water questions; and if they had succeeded, they would have been granted a loan, but as they lost no loan was granted. The attempt was right in either case, whether they succeeded or failed; and he was unable to see the line that was drawn between success and failure.

THE FALMOUTH CORPORATION AND THE WATER-WORKS.

The question of the water supply was again under the consideration of the Falmouth Town Council at their meeting on the 7th inst. One of the members had given notice to move that steps should at once be taken for the purchase of the water-works. Before the motion was reached, however, Dr. Banks proposed, with a view to obtaining definite information as to the purchase of the works, that Mr. Mansergh should be asked his fee for reporting on their condition, on the work necessary to bring them up to date, and the present value of the undertaking. The majority of the Council, he said, were in favour of

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1636.

Issue.	Share.	When last Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share.	When last Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p. c.	20—21	..	5 0 0	60,000	5	Feb. 23	7	Ottoman, Ltd. . . .	5—5½	..	6 7 3
100,000	10	,,	7½	Do. 7 p. c.	13½—14½	..	5 3 5	500,000	100	June 1	6	People's Gas } 2nd Mtg. of Chicago } Bonds .	102—106	..	5 13 2
800,000	100	Jan. 2	5	Australian 5 p. c. Deb. .	102—104	..	4 16 2								
200,000	5	May 16	6	Bombay, Ltd. . . .	6—6½	..	4 12 4	851,070	10	Apl. 27	7	River Plate Ord. . . .	10½—10¾	..	6 10 3
40,000	5	,,	6	Do. New, £4 paid .	4—4¼	..	5 6 8	250,000	Stk.	Dec. 29	4	Do. 4 p. c. Deb. .	101—103	..	3 17 8
880,000	Stk.	Feb. 23	12	Brentford Consolidated	250—260	..	4 12 4	250,000	10	Apl. 11	8	San Paulo, Ltd. . . .	11½—12½	..	6 8 0
270,000	,,	,,	9	Do. New . . .	185—190	..	4 14 9	135,000	Stk.	Mar. 14	10	Sheffield A.	245—247	..	4 1 0
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0	209,053	,,	,,	10	Do. B.	244—246	..	4 1 4
159,375	,,	June 14	4	Do. 4 p. c. Deb. .	116—120*	..	3 6 8	447,427	,,	,,	10	Do. C.	244—246	..	4 1 4
220,000	Stk.	Mar. 14	11½	Brighton & Hove Orig. .	230—240	−2½	4 15 10	5,600,000	Stk.	Feb. 23	5⅓	South Metrop., 4 p.c. Ord.	129—132	..	4 0 9
226,320	,,	,,	8½	Do. A. Ord. Stk. .	175—180	..	4 14 5	1,520,000	,,	Jan. 12	3	Do. 3 p. c. Deb. . .	98—100	..	3 0 0
999,500	Stk.	Feb. 23	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11	380,940	Stk.	May 16	5	Southampton Ord. . . .	115—120	..	4 3 4
420,000	20	Mar. 29	10	British	39—41	..	4 17 7	70,825	,,	Dec. 29	4	Do. 4 p.c. Deb.	120—125	..	3 4 0
50,000	10	Feb. 23	12	Bromley, Ord. 10 p. c. .	24—26	..	4 12 4	120,000	Stk.	Mar. 14	6	Tottenham } A. 5 p.c. and } B. 3½ p.c.	120—125	..	4 16 0
79,000	10	,,	9	Do. 7 p. c. . . .	19—21	..	4 5 8	250,520	,,	,,	4½		93—98	..	4 11 10
500,000	10	May 16	6	Buenos Ayres (New) Ltd.	9—9½	..	6 6 4	55,100	,,	June 14	4	Edmonton } 4 p. c. Deb.	111—115*	..	3 9 7
220,000	Stk.	June 14	4	Do. 4 p. c. Deb. .	99—101*	+1	3 19 3	182,380	10	Jan. 12	5	Tuscan, Ltd.	7—8	..	6 5 0
150,000	20	Mar. 14	8½	Cagliari, Ltd. . . .	24—26	..	6 6 11	149,900	10	Jan. 2	5	Do. 5 p. c. Deb. Red.	101—104	..	4 18 2
100,000	10	June 14	8	Cape Town & Dis., Ltd.	14—15*	+½	5 6 8								
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	55—57:	..	5 5 3								
550,000	Stk.	Apl. 11	13½	Commercial Old Stock .	275—285	..	4 14 9								
236,425	,,	,,	10½	Do. New do. .	210—220	..	4 15 5								
288,237	,,	June 14	4½	Do. 4½ p. c. Deb. .	137—141*	−1	3 3 10								
800,000	Stk.	May 31	9	Continental Union, Ltd.	155—165	..	5 9 1								
200,000	,,	,,	7	Do. 7 p. c. Pref. .	170—175	..	4 0 0	780,399	Stk.	Dec. 29	11	WATER COMPANIES. Chelsea, Ord.	303—308	..	3 11 5
51,600	Stk.	Feb. 23	14	Croydon A 10 p. c. . .	335—340	..	4 2 4	150,000	,,	,,	5	Do. 5 p. c. Pref. .	157—162	..	3 1 9
173,400	,,	,,	11	Do. B 7 p. c. . .	265—270	..	4 1 5	160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	145—150	..	3 0 0
555,000	Stk.	Feb. 23	5½	Crystal Palace Ord. 5 p.c.	116—120	..	4 7 6	175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	145—150	..	3 0 0
60,000	,,	,,	5	Do. 5 p. c. Pref. .	130—135	..	3 14 1	1,720,560	Stk.	Apl. 11	7	East London, Ord. . .	192—196	+1½	3 11 5
486,090	10	Jan. 26	11	European, Ltd. . . .	19½—20½	..	5 7 4	654,740	,,	June 14	4½	Do. 4½ p. c. Deb. .	142—147*	..	3 1 3
854,060	10	,,	11	Do. £7 10s. paid .	14½—15½	..	5 6 5	390,000	,,	,,	3	Do. 3 p. c. Deb. .	97—99*	..	3 0 7
14,993,075	Stk.	Feb. 9	4⅗	Gas- } 4 p. c. Ord. . .	101—103	+½	4 15 1	700,000	50	June 14	7½	Grand } 10 p. c. max. .	103—106*	+2½	3 10 9
2,600,000	,,	,,	3½	light } 3½ p. c. max. .	96—98	..	3 11 5	810,000	Stk.	Mar. 29	4	Junction } 4 p. c. Deb. .	130—135	..	2 19 3
3,799,735	,,	,,	4	and } 4 p. c. Con. Pref.	116—118	..	3 7 10	708,000	Stk.	Feb. 23	14	Kent	307—312	..	4 9 9
3,993,975	,,	June 14	3	Coke } 3 p. c. Con. Deb.	95—98*	..	3 1 3	160,000	,,	,,	7	Do. New, 7 p. c. max. .	200—210	..	3 6 8
70,000	10	May 31	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4	1,043,800	100	Dec. 29	10½	Lambeth, 10 p. c. max. .	290—295	..	3 11 2
2,800,000	Stk.	May 16	10	Imperial Continental .	205—208	..	4 16 2	406,200	100	,,	8	Do. 7½ p. c. max. .	207—212	..	3 15 6
473,600	Stk.	Feb. 9	3½	Do. 3½ p. c. Deb. Red.	100—103	..	3 8 0	350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	130—133	..	3 0 9
75,000	5	June 14	6	Malta & Medn., Ltd. .	4½—5*	..	6 0 0	500,000	100	Feb. 23	13½	New River, New Shares	422—427	+4	3 3 2
560,000	100	Apl. 2	5	Met. of } 5 p. c. Deb.	107—110	..	4 10 11	1,000,000	Stk.	Jan. 26	4	Do. 4 p. c. Deb. .	132—137	..	2 18 5
250,000	100	,,	4½	Melbourne } 4½ p. c. Deb.	106—108	..	4 3 4	902,300	Stk.	June 14	7½	South- } Ord. . . .	193—197*	..	3 16 2
541,920	20	May 31	3½	Monte Video, Ltd. . .	10½—11½	..	6 1 8	126,500	100	,,	7½	wark } 7½ p. c. max.,	182—187*	..	4 0 3
667,946	Stk.	Feb. 23	9½	Newc'tle & Gatesh'd Con.	215—220	..	4 4 1	489,200	Stk.	,,	5	and } 5 p. c. Pref.	157—162*	..	3 1 9
299,855	Stk.	Dec. 29	8½	Do. 8½ p. c. Deb. .	104—107	..	3 5 5	1,019,585	,,	Apl. 11	4	Vauxhall } 4 p. c. A Deb.	129—134	..	2 19 9
150,000	5	May 16	8	Oriental, Ltd. . . .	7—7½	..	5 6 8	1,155,066	Stk.	June 14	10	West Middlesex . . .	280—285*	..	3 10 2
135,000	5	,,	8	Do. New, £4 10s. pd.	6¼—6⅝	..	5 6 8	200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	145—150*	..	3 0 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1½	..	4 11 5	200,000	,,	Mar. 14	3	Do. 3 p. c. Deb. .	99—101	..	2 19 5
					* Ex. div.								*Ex div.		

the principle of purchase; but before they could decide anything they must have some detailed information from an engineer. After considerable discussion, it was decided that application should be made not only to Mr. Mansergh, but to Mr. A. Phillips and Mr. C. Hawksley; and in this altered form the motion was carried by the casting vote of the Mayor. The opponents of the proposition suggested that the object of the mover of the resolution was to obtain a high price for the water-works. Mr. T. J. Thuell, who had given notice of the resolution in favour of immediate purchase, decided to postpone it. The Mayor remarked that the Corporation had often expressed a wish to become possessed of the water-works. It was desirable that they should own them, but he by no means committed himself to compulsory purchase. At all events, they ought to have advice before they moved in the matter. A further discussion took place on the subject of a notice from the Water Company of their intention to commence the laying of new mains. Mr. H. Liddicoat, a representative of the town on the Cornwall County Council, wrote protesting against the opening of the streets during the summer, when the town would, or should, be full of visitors, and said that if this were done he should oppose any further grant from the County Council towards the maintenance of the roads. The Town Clerk pointed out that the Company could please themselves, as they were legally entitled to open the streets. Mr. J. Grose thought they need not be apprehensive of any energetic action on the part of the Company. The Mayor said that in the winter they urged the Company to leave the work until the summer. The Surveyor would watch the matter with a view to reducing the inconvenience to a minimum; but, having regard to the pressure put on the Company to improve the supply, and to Dr. Buchanan's report to the Local Government Board on the need of improvements in the distribution, he should feel sorry to delay these important measures. The Surveyor said the work would completely block the main streets. It was decided to ask the Company to do the work by night, and to hurry it forward as quickly as possible when it was commenced. Mr. J. W. Buckley expressed the fear that their representations would have no effect.

Southport Corporation Gas Supply.—At the meeting of the Southport Town Council last Tuesday, Dr. Isherwood, in moving the adoption of the minutes of the Gas Committee, stated that in the past financial year they had made a gross profit of £20,672, and a net profit, after paying interest and sinking fund, of £10,323, which had enabled them to hand over to the Council £9000 for the reduction of the rates—carrying forward £1323. They would have made as large a profit as they did in the previous year but for the fact that they had paid £4143 more for coal, cannel, and oil; £250 more as their proportion of the salaries at the Town Hall; £338 more for income-tax; £659 for repairs which ought to have appeared in the previous year's accounts; and £1170 more for interest and sinking fund. Last year, the cost of gas was 2s. 2¼d. per 1000 cubic feet; but in the current year the increased price of raw material would add 3¼d. to it. Alderman Fisher wished to move an amendment to sanction the placing of £500 out of the £1323 to the reserve. But he could not find a seconder; and the minutes were passed.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Perth Gas Commissioners had their annual accounts before them on Monday. Mr. W. Watson, the Convener of the Works Committee, who presented them, said that the total receipts were £27,247, and the expenditure was £22,042, which left a surplus of £5205 on the year's working. The receipts for gas sold amounted, less £537 of discounts, to £23,836, gas-stove rentals produced £537, secondary products £2299, coke and tar £1355, and property £50. The principal item on the expenditure side was £14,130 for coal; and the next largest were men's wages £3650, and salaries £926. Including £857 brought forward, the balance at credit of the profit and loss account was £6062, which was applicable to the payment of annuities, interest on debt, sinking and contingency funds, and depreciation of works fund. These required £6676, so that there was a debit on the year's working of £614. The Auditor (Mr. R. Morrison) had reported that the debt of the Commission had been increased by £52,500, less £23,500 of temporary loans paid therefrom and £1500 of bonds paid off at Whitsunday, 1899. For the year, an exceptional amount of £771 had been allowed for depreciation of works. There was an average increase of 10 per cent. in the quantity of gas manufactured, as compared with an increase of 7 per cent. in the previous year. There were 8376 consumers, as against 7966. Many things, Mr. Watson said, had occurred during the year to upset the estimate; but they were not any worse than in many parts of the country. In dealing with the estimates for the current year, an increased output of gas to the extent of 10 per cent. had been allowed. Mr. M'Lusky had gone over the coal account; and it had been agreed to estimate for 16,050 tons, at an average price of 20s. 6d., which meant an increase on the coal account of £3120. The increased expenditure required them to raise the price of gas from 3s. 2d. to 3s. 6d. per 1000 cubic feet. The revenue from gas was thus estimated to be £26,412. After some discussion, the report was adopted. It may truly be said that, notwithstanding the small deficit on the year's working, the Commissioners have no reason to be otherwise than satisfied. They have a splendid business in their hands; and if they give good heed to the advice of their Manager, and keep to business principles, there is every reason to anticipate continued prosperity. They are "swopping" Managers in the meantime; but it is not being done in "mid-stream," because Mr. M'Lusky is taking up the duties practically at the commencement of a year—a circumstance which must be agreeable to all parties. While we welcome the coming, we must not forget to speed the parting Manager. Mr. Wilson, on leaving Perth, has the sympathy of his brethren, and their hearty good wishes for his welfare.

On Monday, the Dunfermline Gas Commissioners had before them the fourth annual report by Mr. Hubert Pooley, their Engineer and Manager. It stated that during the year 8592 tons of coal were carbonized, yielding 82,900 300 cubic feet of gas. This was an increase of 5,778,400 cubic feet, and an average of 9649 cubic feet per ton. The gas sold amounted to 77,475.700 cubic feet, or an average of 9017 cubic feet per ton. The balance of 5,424,600 cubic feet, or 6·54 per cent. of the manufacture, was

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due to leakage, condensation, &c. With one exception, this was the lowest amount of loss for many years; and he believed it was the smallest percentage of unaccounted-for gas in the history of the undertaking. In the preceding year, the figures were 6,071,300 cubic feet, or 7·87 per cent. The demand for coke during the year was heavy, and good prices were obtained. Tar and liquor sold under contract had also produced a better price. The net revenue from them was £2054, as against £1298 in the preceding year. The number of gas accounts on the books at May 15 was 5462, as compared with 5060 last year. Prepayment meters had increased from 832 to 1040; and there were 450 persons deriving benefit from the differential rate, as compared with 323. During the year, there had been 39 gas-engines and 560 cookers in use, which included 277 cookers given free of hire to consumers with prepayment meters. In the previous year, the figures were 33 gas-engines and 374 cookers, inclusive of 192 cookers for prepayment meters. Coal contracts had been entered into at an average of 4s. 0¾d. per ton in advance of last year's price; and there had been a further increase in the cost of nearly all materials under annual contract. As stated in these "Notes" last week, Mr. Pooley recommended that the price of gas should be increased by 2d. per 1000 cubic feet to ordinary and differential consumers, and by 5d. to prepayment consumers. There was a difference of opinion in the Commission as to whether there should be an increase in the price of gas or not; and the matter was sent back to the Committee to consider. The Committee have since met, and, by the casting vote of the Chairman, have adhered to Mr. Pooley's recommendation. This resolution will be submitted to the July meeting of the Commissioners. One of the proposals before the Commission was that the price of gas should be increased by a penny. I should say that the Commissioners are scarcely in a position to purposely estimate for a deficit, taking the risk of adverse circumstances making the deficit much more than anticipated. They are almost shut up to an increase in price; and if there is to be an increase, seeing that 2d. is so moderate a sum when compared with what has been found necessary in many other places, it will be more satisfactory for the working of the undertaking if this figure is agreed to. The business can easily stand it.

On Monday, Sir John Cheyne, Q.C., Sheriff of Renfrew and Bute, held an inquiry at Paisley under an application by the Corporation of that burgh to the Secretary for Scotland, for the issue of a Provisional Order authorizing £200,000 to be borrowed for water-works extensions. Mr. Jas. Lee, the Master of Works, stated in evidence that the total cost of the extensions which they desired to make was estimated at £205,000. The work would be divided into three sections. Pipes of larger capacity would be laid between the Camphill and Rowbank reservoirs at a cost of £88,500, and between Rowbank reservoir and the Stanley high-level filters at a cost of £51,000. The Commissioners would also require to make extensions at Glenburn. At present, Glenburn water was discharged into the low-level system by an open conduit. They had, of course, plenty of water in the low level. It was on the high-level system that they wanted to get as much water as possible. They proposed to bring the water down from Glenburn by a pipe to the high-level filters, so as to increase the amount of water at that point as much as possible. This pipe would form a valuable reserve in case of a breakdown. The cost of this section would be £6200. The supply to Johnstone, which had been found to be insufficient, they also desired to augment, at an outlay of £6800. They further proposed to increase the storage capacity at the clear-water tanks, at a cost of £30,000. The existing mains would require alterations, which he estimated to cost about £8000. Wayleaves for the proposed extensions would amount to £15,000. Sheriff Cheyne is to consider the evidence before giving his recommendation. There was no opposition to the application.

The Glasgow Corporation Gas Committee have agreed to the proposal to have the first sod of the new gas-works at Provan cut on an early day. The date of the ceremony will probably be the 4th prox.—American Independence Day; and the Lord Provost will be the presiding genius—Bailie Mitchell, Convener of the Works Sub-Committee, taking a prominent part in the day's work.

The Corporation of Port Glasgow have just settled their coal contracts, at an average price of 20s. 2½d. per ton. This makes the Gas Committee's coal bill upwards of £1400 heavier than it was last year. In all, 4500 tons have been contracted for, and the selection of the coal is estimated by the Manager (Mr. W. Mackie) to yield per ton an average of 9577 cubic feet of gas having an illuminating power of 26·21 standard candles.

The Dundee Water Commissioners held their annual meeting on Thursday, and heard Treasurer Ritchie's explanation of the accounts for the past year. Their estimated revenue, he said, including a surplus from the preceding year of £1026, was £48,971; and the actual revenue was £50,294. Their estimated expenditure was £48,820, and the actual expenditure was £49,056. The revenue was thus £1323 more than the estimate, and the expenditure was £236 over the estimate. The net result was that, instead of closing the year with a surplus of £151 as estimated, they had a surplus of £1238. The sinking fund required £6397, and nearly the whole of it had already been applied in the reduction of debt. The capital expenditure during the year amounted to £3295, of which £2212 was upon extensions of piping. The accounts were approved; and the hope was expressed that the Treasurer might be able to recommend a reduction in the domestic rate.

The financial statement of the Edinburgh and District Water Trust for the year ending May 15 has been issued. It shows that the estimated expenditure was £107,444, and the actual expenditure £103,559, or £3885 below the estimate. The estimated income was £107,392, while the actual income had been £110,620, or £3228 over the estimate. The surplus upon the year's working is £7061.

The Town Council of Port Glasgow have recently made their annual inspection of the gas and water works belonging to them. At the gas-works, it was stated that there had been an increased output of gas during the year to the extent of 2 million cubic feet. The water supply is felt to be now inadequate; and the Council have in mind the extension of the works.

A Committee of the Dalkeith Town Council have prepared a report upon the subject of lighting the town by means of electricity. The Committee recommend the Council to accept an offer by Messrs. Crompton and Co., Limited, of London, and to authorize the firm to apply for a Provisional Order. The cost for street lighting would be at the rate of 3d.

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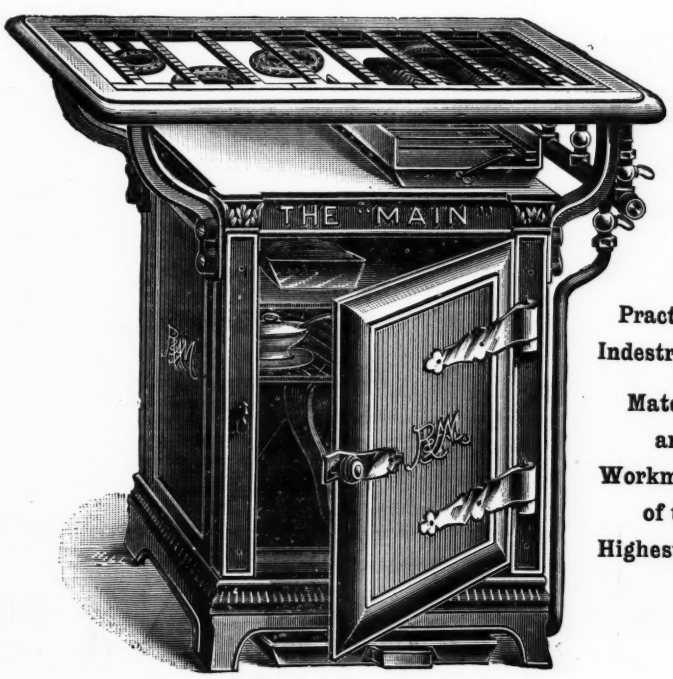

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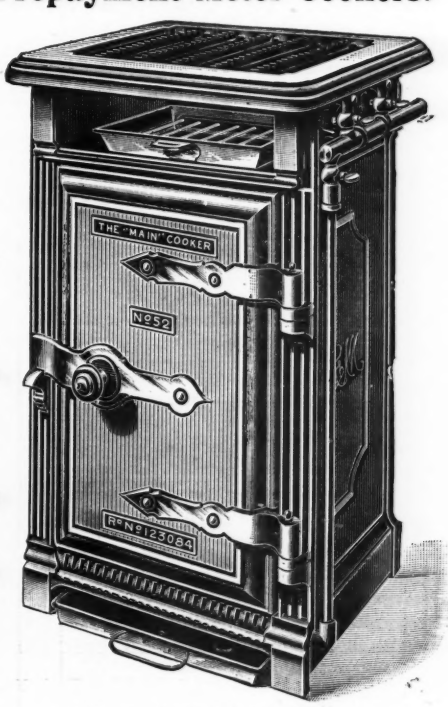


Prices from 25s. to 80s.

per unit, which the Committee think would be much cheaper than gas, the charge for which is 4s. per 1000 cubic feet, with a discount of 5d. to the burgh. They consider that at 3d. the charge would be equivalent to gas at 2s. per 1000 cubic feet. Thus are the toils laid for an unsuspecting public, who will always find that, no matter what the rate charged, the cost of lighting by electricity is invariably considerably greater than that of lighting by gas, and that the light is not so satisfactory for working by. In a newspaper office I know, where electricity is laid on, but gas is retained, to be used in emergencies, the men would light the gas, to supplement the electric light, were it not for the most peremptory orders to the contrary by the proprietors.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 16.

Sulphate of Ammonia.—The market continues to droop; and closing quotations are £11 per ton f.o.b. Hull, and £11 2s. 6d. f.o.b. Leith and Liverpool. Buyers find in declining prices encouragement to hope for still lower values rather than temptation to operate; and there has been a marked absence of direct business. Available supplies, however, continue limited; and any important demand would probably result in a sharp recovery. Concurrently with the decline in spot values, the forward position has also given way; and a premium for July-August delivery would hardly now be obtainable.

Nitrate of Soda is weak at 7s. 10½d. per cwt. for ordinary, and 8s. 3d. for fine, quality on spot.

LONDON, *June* 16.

Tar Products.—Benzol shows a little more firmness, although considerable variation in prices exists at the several points of production, arising from the heavy railway carriage on it and the difficulty with railway companies and carriers in taking it at all. There is a difference between the lowest and the highest prices quoted in various positions of at least 2d. per gallon. There is more inquiry for creosote and heavy oils; but prices mentioned are low as compared with recent rates. Carbolic acid is a steady market; and the same may be said of pitch, although very little new business is reported for next season. Makers are demanding at least equal to to-day's prices. There is nothing special doing in anthracene, which continues to be marked at a low figure. Average prices are as follows: Tar, 17s. 6d. to 28s. Pitch, east coast, 37s.; west coast, 34s. Benzols, 90's, 6d. to 8d.; special qualities for gas, 9½d.; 50's, 11d. Toluol, 1s. 2½d. Solvent naphtha, 1s. 1½d. Crude naphtha, 3¾d. Heavy naphtha, 1s. Creosote, 2¼d. Heavy oils, 3d. Carbolic acid, 50's, 2s. 2d.; 60's, 2s. 8d. Naphthalene salts, drained, 33s.; pressed, 70s. Anthracene, "A," 4d.; "B," 2¾d.

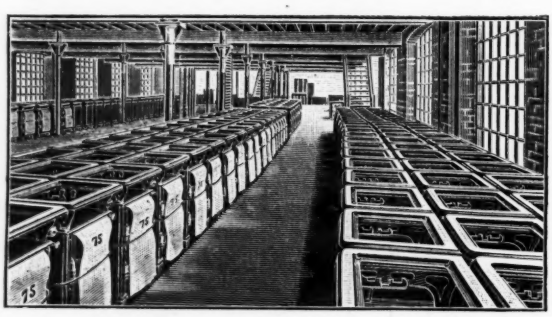
Sulphate of Ammonia.—This market is extremely dull. Very little business is being done; and for forward delivery inquiries have seriously fallen off. Much of the shipments now going on are on old contracts. The make is small; and there are but few urgent sellers. £11 to £11 2s. 6d. per ton, less 3½ per cent., is the average value.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—With the settlement by the Salford Corporation for the quantity of gas coal they will require for the ensuing year, amounting to 99,000 tons, in addition to 48,500 tons of cannel, the last important contract in this district has now been concluded. Of course, neither with regard to the Salford nor the Manchester Corporation contracts have the actual prices been allowed to transpire; but from inquiries, it can be gathered that on all new contracts for the ensuing year the advance has been about 5s. over 1899 rates. The Manchester Corporation, however, have been in the satisfactory position that in 1899 they bought a good deal of coal for delivery over the ensuing two years, with the result that a considerable quantity of this has to come in. It is stated that they have not this year been under the necessity of buying at the advanced prices more than about one-third of their full ordinary supply; while it is also affirmed that they have not been compelled in all cases to accept the special conditions which collieries have this year laid down with regard to their contracts, to which reference has previously been made in these reports. The result is that the Manchester Corporation have been in rather an independent position; and averaging the price of the coal they have had to buy this year, and the prices on the deliveries that have still to come in on contracts placed twelve months ago, the advance is much below what they would otherwise have had to pay. At the pit, the average basis on which coal has been bought for the ensuing twelve months may be given as about 13s. 6d. to 14s. per ton for the commoner qualities, up to 14s. 6d. and 15s. for the best screened Arley gas coal. The better qualities of round coal are now beginning to hang at collieries, and some fair quantities are accumulating on the pit-banks, or at the wharves and yards; but as these are more than required to replenish the depleted stocks, in view of the ensuing winter's requirements, there is no pressure to sell. Prices remain firm at the full basis of 13s. 6d. to 14s. per ton for common, and 14s. 6d. to 15s. 6d. for the better qualities at the pit; while it is even contemplated that as early as next September there may be some further advance upon present rates—the amount mentioned being generally about 1s. 8d. per ton. As to the lower qualities of round coal and engine classes of fuel, it would almost seem that prices have reached the top, so far as forward contracts are concerned, although there may possibly be some stiffening on the rates quoted for current sales. The demand for these continues active, and is taking away all the Lancashire collieries are raising; but slack is coming in more plentifully from outside districts, and consumers are in the position that they have now no difficulty in covering all their requirements either for steam and forge coal or engine fuel. At the pit, steam and forge coal remains at about 13s. per ton, with Lancashire slack ranging from 10s. 6d. to 11s. 6d., according to quality. The shipping demand is moderate, with the official list rates steady at 14s. 6d. per ton for unscreened to 15s. 3d. for screened steam coal, delivered at the Mersey ports. Coke continues in brisk request, with prices firm at from 24s. 6d. to 25s. for furnace, to 31s. and 32s. for foundry qualities, at the ovens.

STRATFORD WORKS.



STRATFORD WAREHOUSE, No. 1.

"Noble stock, I'd wish no better choice."—Pericles V., 1.

THROUGH INCREASED PRODUCTION, WE CAN SHOW YOU 6000 "MODEL" COOKERS IN STOCK. WHY WAIT FOR OTHERS? WIRE US.

GAS APPARATUS..LONDON
STOVES.....WARRINGTON
OGEN.....LONDON

"Fetch forth the stocks, ho!"—Lear II., 2.

Northern Coal Trade.—There is a full demand for coals, because of the lessened shipments expected for the rest of the month, through the effect of the coming local holidays. The collieries are well employed; and this week's output will be heavy. Best Northumbrian steam coals vary from 17s. 9d. to 18s. per ton f.o.b., second-class steam are about 17s., and steam smalls 13s. Household coals are in much lower demand; but there is little or no change in the prices. Manufacturing coals are very firm; and the demand is good. There is little change in smithy coals. In the gas coal trade, the demand is very heavy for this season of the year, both for export and for home use; and with full work there is a large production which is readily taken up. For occasional cargoes of best Durham gas coals, the quotation is 17s. per ton f.o.b.; while the contracts are based on about 16s. per ton. One of the chief of the Tees-side towns has just decided not to buy for a year, but to try to obtain supplies for a shorter period—a rather significant circumstance for consumers so near to the northern coal field. Best Durham coke is firm at 35s. per ton for export. There is no alteration in the position of gas coke; but the output is now at its lowest point. Prices are unaltered this week.

Scotch Coal Trade.—The market is reported strong; the forward demand being particularly active, at prices still higher. The miners are not working as regularly as they might, which has something to do with the present advance in prices. The quotations are: Main 14s. 3d. to 14s. 6d. per ton f.o.b. Glasgow, ell 15s. 6d. to 16s. 6d., and splint 15s. 9d. to 16s. The shipments for the week amounted to 201,116 tons—a decrease of 25,252 tons upon the previous week, but an increase of 25,657 tons upon the corresponding week of last year. For the year to date, the total shipments have been 4,443,949 tons—an increase of 872,079 tons upon the same period.

East-End Consumers and the Price of Gas.—Last Thursday afternoon an influential deputation of East London gas consumers waited upon the Directors of the Commercial Gas Company for the purpose of asking them to reconsider their action in raising the price of gas from 2s. 6d. to 3s. per 1000 cubic feet. Mr. Spencer Charrington, M.P., speaking on behalf of the deputation, said it was thought the price of gas had been raised disproportionately high, after taking into consideration the increase in the price of coal. Mr. H. H. Marks, M.P., said the people of St. George's-in-the-East felt that a hardship was being imposed upon them, especially in view of the fact that for about seventeen years the maximum charge by the Company was 2s. 9d. per 1000 cubic feet. Mr. Steadman, M.P., said it seemed strange that when the Company were able to pay a dividend of 13½ per cent. they raised the price so substantially. The action of the Directors inflicted a severe hardship upon the tradespeople of East London; and he considered the increased cost in the price of coal might be equally borne by shareholders and consumers. Mr. J. Blacket Gill, in reply, said he could not hold out any hope of a reduction in the charge for gas at present. Owing to the advance in the price of coal, and other expenses connected with the manufacture of gas, it was impossible for his Board to adopt any other measure.

The St. Mary Church Gas-Works.—It has been decided bythe St. Mary Church District Council to apply to the Local Government Board for power to borrow £10,000 for gas-works purposes. Messrs. Willey and Co., of Exeter, are to report upon what is necessary to make the works efficient, as well as present an estimate of the cost of carrying out the work.

The Water Supply of Llangollen.—As a result of a recent inquiry by the Local Government Board, permission has been granted to the Llangollen Urban District Council to raise a loan to cover the expenses of £2120 16s. 3d. incurred in law costs in defending the rights of the town to draw its water supply from the Vivod Valley. Sanction has also been given to the cost of relaying the mains (which have become defective) to the reservoirs in the Valley.

The Rating of Reservoirs.—At the last monthly meeting of the Middlesex County Council, a letter addressed to the General Purposes Committee by Sir F. Dixon-Hartland, Chairman of the Thames Conservancy Board, with reference to the rating of reservoirs, was read. In the course thereof, Sir Frederick referred to "the great injustice" of reservoirs being rated to the general district rate in urban districts, and to special district rates in rural districts at one-fourth only of their rateable value. He said: "These reservoirs are constructed for trade purposes, and contribute to the Water Companies' profits, and there is no reason why they should be rated on the same basis as natural ponds on agricultural land. The effect of this reduction in the assessment is very important in many of the Middlesex parishes, and will, when the whole system of reservoirs foreshadowed in the report of the Royal Commission on Water Supply is carried out, be an increasingly burning question, to show the importance of which it is only necessary to state that there is a reduction in the rates of £800 a year in one Middlesex parish alone—that of Sunbury-on-Thames." He considered the time was ripe for the question to be taken up by the County Councils' Association.

Braunton Water Supply.—An inquiry was held at Braunton last week respecting an application by the Barnstaple Rural District Council for power to borrow £3500 for works of water supply. The population of the village is 2170, and the supply is estimated to be equal to about 14½ gallons per head of the population. The Clerk to the District Council (Mr. W. H. Toller) said many difficulties had to be encountered in obtaining water. Some plans had been abandoned because of the exorbitant demands of the landowners. They had no power to acquire water compulsorily without having recourse to an Act of Parliament; and this was too expensive a procedure for a village water supply. There was urgent need for legislation to make it easier for local authorities to carry out such schemes. Mr. H. D. Nichols (Messrs. Beesley, Son, and Nichols, of Westminster) gave evidence as to the plans, and a number of witnesses testified to the need of a better supply than that afforded by the wells in the village. Some opposition was offered by farmers, who said that their interests would suffer by the impounding of the water. Mr. Toller said that these persons had no legal claim to compensation; but if any were substantiated, the amount would have to be settled by arbitration.

Charge of The Richmond Brigade.

(By an ABERDONIAN GAS OFFICIAL.)

(*With profuse apologies to the Shades of Tennyson.*)

[At the Aberdeen Trades Exhibition (June, 1900) Messrs. Richmond & Co. said they meant to book orders for 600 Cookers.]

Half a league, half a league,
Half a league onward,
All through the town they went
In search of six hundred
"Forward Richmond's Brigade!
Charge!" and the charge was made.
Straight from the Hall they sped
To get that Six hundred.

"Forward, Richmond's Brigade!"
Was there a man dismayed?
Not though canvassers knew
'Twas a large order:
Their's not to make reply,
Their's not to reason why,
Their's but to have a try,
So round the town they go,
Their watchword "Six hundred."

Cookers to right of them,
Cookers to left of them,
Cookers in front of them
Need it be wondered;
With canvassers East and West,
Each of them doing his best,
That at the three weeks' end,
Heaven with this shout they rend
"We've booked that Six hundred."

"Forty's" and "Sixty's" there,
One Hundred and Twenty's" (120) where,
Rivals in grim despair,
Often were heard to swear
There were no orders;
Booking them fast as smoke
Previous records broke,
Orders still coming.
Rivals who tried "a small stroke"
Shattered and sundered,
Richmond's Brigade came back
And shouted "Six hundred."

Cookers to right of them,
Cookers to left of them,
Cookers in front of them,
People had wondered;
Why! with the coal so dear,
They should have any fear,
To book for at least a year,
Now they had seen them here,
One of Six hundred.

When can their glory fade?
There was the record made.
People in wonder.
Honour the charge they made!
Honour Richmond's Brigade,
Their motto "Six Hundred,"

Barry Gas and Water Supply.—The Barry District Council secured the gas and water joint undertakings a few years ago at a net cost of £200,000. The accounts of the undertakings for the past financial year have just been presented to the Gas and Water Committee, and show that on the supply of gas a net profit of £1860 was made, while there was a net loss of £3358 on the water supply; the net deficiency on the joint undertakings being £1498.

Regenerator Settings for Small Gas-Works.—An instructive instance of the application of regenerative heating to gas-retorts will shortly be presented at the works of the Sileby Gas Company, which are to be practically rebuilt, in accordance with plans prepared by Mr. A. T. Harris, of Market Harborough, at a cost of £4000. The retort-house will contain a bench, consisting of three settings on the regenerator principle, erected by Messrs. Jonas Drake and Son; and as the output is less than 4 million cubic feet per annum, a good test will be afforded as to whether or not this system pays in very small works. Messrs. R. & J. Dempster, Limited, have the contract for the retort-house roof, condensers, engine and exhauster, scrubber, purifiers, and gasholder.

Reduction in the Price of Gas at Silsden.—At the meeting last Tuesday of the Silsden District Council, they discussed at some length the price charged for gas and the discounts allowed. Hitherto the price has been 5s. per 1000 cubic feet gross, and 3s. 9d. if accounts are paid by the first day of the month following the delivery of the account. The new arrangement is that the price will be 3s. 9d. and 3s. 4d. A letter was received from the Kildwick Parish Gas Company intimating that the price of gas from the 1st of July would be raised for lighting purposes to 4s. 2d., less 5d. discount (3s. 9d.), and for heating purposes to 4s. 2d., less 1s. 0½d. discount (3s. 1½d.). The Clerk (Mr. J. Driver) said this would not affect Silsden, as the Gas Company were under a contract.

The Delights of Gas Managership.—At the monthly meeting of the Tow Law District Council last Thursday—Mr. R. Sproates presiding—Mr. Hillary, the Surveyor, complained of the refusal of the Gas Manager, Mr. Kemp, to carry out certain requests in regard to appliances and material for the Pretoria celebrations, and a breach of instructions from the Council. The complaints were specified as refusals to supply the Surveyor with a bucket of tar and a ladder for the celebration referred to. It was also reported that Mr. Kemp had allowed a chimney sweep to sleep on the gas-works, contrary to instructions. Mr. Brewer moved that the Manager receive three months' notice; but he subsequently spoke in favour of a month. They would, he said, be able to get another man at the present time without much difficulty. The Chairman asked if this was not an extreme step. Mr. Brewer did not think it was. This was not the first time the Manager had acted contrary to the wishes of the Council. Mr. Hillary suggested that the best way would be to visit the next act of insubordination with discharge. Mr. Robson seconded the motion. Mr. Harrison moved, as an amendment, that the Manager be instructed that he must obey Mr. Hillary or send in his resignation. After some further remarks, Mr. Blenkiron seconded the amendment. The voting being equal, the Chairman gave his casting vote in favour of the amendment.

Profit-Sharing at Stafford.—On the recommendation of the Gas and Electricity Committee, the Stafford Town Council last Tuesday adopted the bonus system for the employees at the works, with the view of giving them a direct interest in the prosperity of the undertakings. The resignation of the Engineer and Manager (Mr. J. Ferguson Bell) was accepted, and the Committee were authorized to advertise for a successor.

Stourbridge Gas Undertaking.—The statement of accounts of the Gas Department of the Stourbridge District Council for the year ending March 31 has been issued. The total expenditure has been £123,574, of which £98,454 was for the purchase of the undertaking, and the remainder for new plant, &c. The gas made was 153,269,500 cubic feet; and deducting the gas sold and used on the works, no less than 14,758,400 cubic feet were unaccounted for. But the Council have 40 miles of mains. They made £8460 profit on gas and £293 on the fittings account last year.

New Retort-House and Station Meter at the Market Harborough Gas-Works.—In order to meet the increased demand for gas, the Market Harborough District Council, acting upon the recommendation of their Gas Engineer and Manager (Mr. A. T. Harris) have unanimously decided to build a new retort-house, and to erect therein a retort-bench comprised of six settings of regenerator furnaces. The contract for the bench, including all the ironwork, has been placed with Messrs. Jonas Drake and Son. This work, together with the supply of a new station meter by Messrs. W. Parkinson and Co., to pass 20,000 cubic feet of gas per hour, will cost about £3800.

Birmingham Corporation Finances.—The Birmingham City Council went into Committee last Tuesday in order to consider the estimates. Before they were put to the vote, Alderman Clayton, the Chairman of the Finance Committee, made a few introductory explanations. He said the capital expenditure had been higher during the past year than for the last quarter-of-a-century. The total increase, after allowing for the redemption set aside, was £1,300,000; but, fortunately, a great deal of this was of a reproductive character. The Elan water supply, upon which £707,000 was spent during the year, it was hoped would never be charged on the rates. Then there was £95,000 for the Gas Department; and the Council knew the profits obtained from this undertaking. Another large item was £483,000 upon the Electricity Supply Department, which was not likely to ever increase the rates. The expenditure out of the rates had been higher than in the previous year by £22,900; but, looking at the industrial work of the Corporation, they found that the income of the Gas Department was £98,000 more than in the previous twelve months, and that of the Water Department £7000 more. After reference to the continued rise in the rates, Alderman Clayton gave, as one good point in connection with the capital expenditure last year, that the Committee spent £19,000 less than they had estimated. Having reminded the Council that the rates would be 5s. 5d. instead of 5s. 3d. in the pound, Alderman Clayton concluded by pointing to the rate of interest on loans, which had risen from 2¾ per cent. last year to 3¼ per cent. now. The various estimates were approved, and subsequently sanctioned by the Council.

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Merrifield—Westcott—Pearson Patents.

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W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000

	Cubic Feet Daily.
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON)	250,000

Sale of the Clifton Water-Works to the Halifax Rural District Council.—At the meeting of the Halifax Rural District Council last Wednesday, it was reported that an agreement had been entered into with the Clifton Water Company for the purchase of their undertaking by the Council for £6000.

Gas Explosion Caused by Lightning.—Late on Monday night last week, Highfield House, Elland, the residence of Mr. Jonathan Dodgson, was struck by lightning. The chimney was badly damaged, and a gas-pipe leading into the house was broken. The gas was ignited, and a slight explosion ensued. Happily no serious damage was done, and the family escaped without injury.

Tiverton Corporation Gas Supply.—The Tiverton Borough Accountant has submitted his fifth annual report on the working of the Corporation gas undertaking. The revenue account shows a balance of £1734. After providing for interest and income-tax and the annual payment to the sinking fund, the balance amounts to £256, which has been placed to the reserve fund account; making a total of £2583. There were 220 cooking-stoves in use—an increase of 42 on the previous year. The quantity of gas made and consumed during the year was 30,322,000 cubic feet.

Shrewsbury Water Supply.—An unusual condition of things has arisen between the Shrewsbury Corporation and the Local Government Board. Some time ago the Board called the attention of the Corporation to the water supply of the borough, and suggested that a fresh one should be obtained from Batchcott. The cost of such a scheme was put down at £155,000; and the Corporation have informed the Board that they are unable to bear the expense. At present, the Council are carrying out a system of sewerage, which has already cost £75,952; and other improvements in the existing drainage were required. The debt of the borough amounts to £151,273; and the Council are of opinion that the Batchcott scheme would "result in rates which would be hardly endurable."

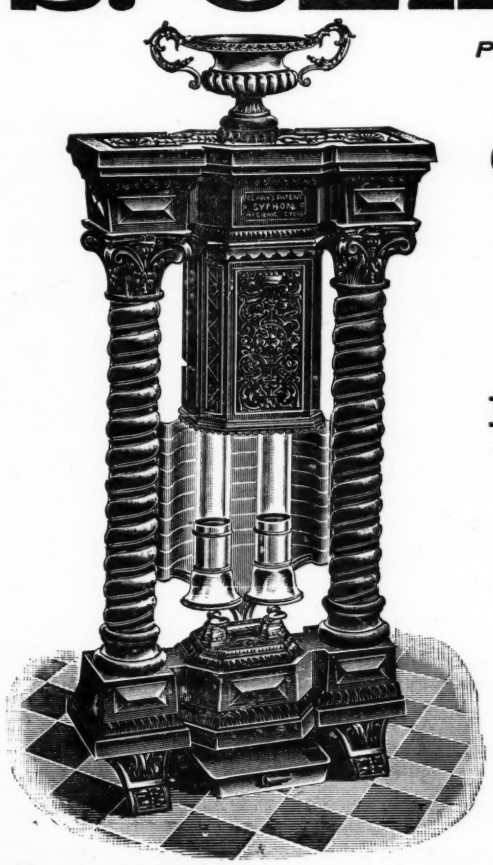
The Yorkshire Coal Trade.—The Sheffield correspondent of "The Times" states that never before in the history of the port of Hull has such a condition of the coal trade been shown as that which is revealed by the return of the Hull Incorporated Chamber of Commerce and Shipping issued on the 9th inst. An expanding trade has been reported, and a great pressure for supplies for export; but the actual figures show a pressure on the Yorkshire coal supply greater than had been realized by any but a few largely interested in the business. The total tonnage forwarded to the port last month—381,872 tons—was 54,736 tons, or 16·7 per cent., more than was forwarded in May, 1899, which was itself a busy month. In the five months of the present year, 1,458,944 tons were sent; being an increase of 215,392 tons, or 17·3 per cent. The quantity of coal exported coastwise last month—61,761 tons—was 114·6 per cent. more than was despatched in the previous corresponding month, most of it going to London; while on the five months' trading the increase amounted to 81·6 per cent. The exports to foreign countries last month totalled 199,628 tons—an increase of 95,618 tons, or 91·9 per cent.; the five months' total amounting to 666,748 tons, being 351,344 tons, or 89·8 per cent.

Increase in the Price of Gas in North London.—The Gaslight and Coke Company have given notice that after the current quarter the price of gas will be 3s. 5d. per 1000 cubic feet.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors, shares and stock of the Herne Bay, Walton-on-Thames and Weybridge, and Southend Gas Companies. Some additional £5 shares in the first-named Company (dividend on similar shares £4 4s. per cent. per annum) were sold at par; "B" shares in the Walton Company (7 per cent.) fetched from £14 12s. 6d. to £15 apiece; and £100 of new ordinary 5 per cent. stock of the Southend Company (last dividend 5½ per cent.) realized £110. On Wednesday, at the same place, Messrs. Fox and Bousfield sold fractional parts of King's shares in the New River Company at the rate of from £108,000 to £112,000 per share, and £100 new shares at £420 and £421 each, *ex div.* They also sold some £10 ordinary shares in the Gas-Meter Company at £29 to £30 5s. each. On Thursday, Messrs. Nichols, Howes, Young, Alder, and Co. sold £10,000 of general debenture stock and some new 4 per cent. debenture stock of the Bristol Gas Company. The former produced £12,028 10s., or an average of £120 5s. 9d. per cent., and the latter £115 per cent. Last Tuesday, Messrs. Woods and Co. sold 580 additional "E" shares of £20 each in the Northampton Gas Company, at an average of £32 3s. 4d. each; the total realized being £18,657 11s.

Water Supply Scheme for East Shropshire.—For some time past difficulties have been experienced in adopting a scheme for supplying the towns and villages in East Shropshire with water. Proposals were made by the East Shropshire Water Company, but the Bill was thrown out by a Committee of the House of Lords. The Shropshire Council have since taken the matter up; and a conference of delegates from the Local Authorities concerned was recently held at Shrewsbury. It was resolved to form an area, including Shifnal, Oakengates, Dawley, Lilleshall, Stirchley, Sheriffhales, and portions of Wellington (rural) and Hadley. The population of this area is put at 27,833; but for Shifnal, Stirchley, and Sheriffhales there is already a scheme under consideration by which these parishes may be supplied with water belonging to the Wenlock Corporation. Leaving out those places, the population to be supplied would be 23,311; and allowing for an increase of 15 per cent., provision should be made for about 27,000 people. At 20 gallons per head, the quantity would be 540,000 gallons per day. The estimate for the scheme, including engineering and contingencies, is £72,000. If the three districts named were included, the cost would be £9000 more. A further provision of 500,000 gallons of water daily for trade purposes would make the cost £110,000; or for 1,000,000 gallons, £125,000. It was recommended that works should be erected sufficient to meet the requirements of the second estimate, with 500,000 gallons of trade water, which might be readily added to should this quantity be exceeded. The working expenses, it is estimated, of a domestic scheme would be £1100 a year; with 500,000 gallons of trade water added, £1550; and with 1,000,000 gallons, £2000. Before further steps are taken, the scheme will be considered by the Local Authorities affected.

S. CLARK & CO.,



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Oldham Corporation Water Undertaking.—In his statistical statement for the past year in connection with the Water Department of the Oldham Corporation, Mr. Arthur Andrew shows that the gross revenue for the year on water account amounted to £62,952; and the gross expenditure to £19,653; the balance carried to profit and loss account being £43,298. After meeting the charges for annuities, interest, and sinking fund, a surplus remains of £4982. The credit balance brought forward from the previous year was £4982, which now left a credit balance of £9762. The income during the past year was £62,952, against £60,426 in the previous year; and the expenditure was £19,653, as against £16,670.

Plympton St. Mary Water Supply.—An application by the Plympton St. Mary District Council for permission to borrow £500 for works of water supply was the subject of a Local Government Board inquiry last Wednesday week. It was explained that the supply was from old mine workings, and that recent investigation had shown that what was supposed to be a spring was, in reality, the overflow of an adit which had fallen in. In order to protect the water from risk of pollution, it was proposed by Mr. H. Francis, the Engineer of the works, to construct a concrete receiving-tank, and to make a brick culvert from the entrance to the adit to the tank. The water was described as of exceptional purity and abundant in quantity.

Taunton Water Supply.—At the meeting of the Taunton Town Council last Tuesday, the Water Committee reported that the Local Government Board had sanctioned a loan of £20,000 for the construction of a new reservoir. Application was made for a loan of £21,500, the estimated cost of the work; but the Board declined to grant the full amount owing to the present position of the borough with regard to its borrowing powers, and the £20,000 would bring the amount up to the extreme limit. The Town Clerk had since communicated with the Board, informing them that during the month a further payment would be made to the loans account; and they hoped to receive sanction to borrow the whole amount required.

Widnes Corporation Gas Supply.—At the meeting of the Widnes Town Council last Tuesday, the Gas and Water Committee submitted the profit and loss account for the past financial year, showing a net profit on the gas account, after providing the sum of £1601 for the cost of public lighting, of £3814. Mr. Davies, in proposing the adoption of the Committee's minutes, said he believed this was the greatest profit they had ever made. This result had been achieved notwithstanding that the price of gas had been reduced to 1s. 5d. per 1000 cubic feet to ordinary consumers, 1s. 3d. to consumers of more than 3 million cubic feet per annum, and 1s. 1d. for gas supplied for motive power, and that they had to spend for coal £2000 more than in the previous year. With regard to the future, he was afraid they would have to face a difficulty. The tenders they had received for coal would amount in the aggregate to upwards of £6000 more than the cost last year. Under these circumstances, they might have to increase the price of gas; but the Committee would certainly do all they possibly could to avoid it. The minutes were adopted.

The Austrian Welsbach Incandescent Light Company.—The recently issued report of this Company shows that the profit earned during the year 1899-1900 is proportionally considerably less than that of the preceding working period, which comprised only nine months. The loss is largely due to increased taxation, whereby the amount paid by the Company was nearly quadrupled. A dividend of 65 per cent., in place of 80 per cent. in the preceding period, is recommended. It is reported that good progress is being made with the manufacture of the Welsbach electric lamp, for which works have recently been established.

New Water-Works for Glastonbury.—The completion of the first and most important part of a scheme which is to cost about £12,000, and involving the extension of the present water-works at Glastonbury, was signalized last Wednesday by the Mayor and Corporation and a number of the principal inhabitants journeying to West Compton, where the water from a recently-acquired spring was turned into the new mains. Besides the scheme referred to, the Council have decided on another, known as the high-level scheme, to supply the higher parts of the town, and this will cost a further £2000. Mr. Hawkins, who was Mayor in 1897-8, performed the ceremony of turning on the water into the main at Edgarley; and the Mayor (Alderman Baily) turned on the water into the reservoir. Mr. Newton (the Engineer) presented each gentleman with a handsome gold key. In the evening, there was a banquet in celebration of the event.

The Gas Manager to the Oldbury District Council (Mr. A. Cooke) has been voted an addition of £50 a year to his salary.

The tender of Messrs. C. & W. Walker, Limited, for the supply of a condenser at the Stafford Corporation Gas-Works, has been accepted.

A party of five members of the Darlington Corporation have been on a deputation "to inquire into the mysterious manifestations of water gas"—visiting London, Rochester, Southall, and Croydon.

The Bishop's Stortford Gas Company, Limited, has been registered with a capital of £20,000, in £10 shares, to acquire the business of a Company of the same name (incorporated in 1871), and to carry on the business of a gas company generally.

A project is on foot for laying down a line of water-pipes for the supply of Coolgardie. It is an enterprise of the first magnitude, and involves the construction and placing of 328 miles of 30-inch steel pipes, which will deliver 5 million gallons of water daily.

The surrender of Pretoria was celebrated at Reading by general rejoicings, including a great procession and carnival, on the night of the 6th inst. From the account of the show given in the "Reading Observer," we learn that the Reading Gas Company had a procession on their own account, marshalled by Mr. A. H. Cane. The tableau was a reproduction of an advertisement which has from time to time appeared in the "JOURNAL." It represented Kruger carrying a goose to the Colonial Secretary to be cooked. Behind Mr. Chamberlain floated the Union Jack, and behind Kruger was the Boer flag, hung half-mast high. The tableau was preceded and followed by patriots carrying lanterns, torches, &c.

C. & W. WALKER, LTD.,

Midland Iron-Works, Donnington, nr. Newport, Shropshire.

110, CANNON STREET, LONDON, E.C.

Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

MAKERS OF GADD & MASON'S SPIRAL-GUIDED

GASHOLDERS

GASHOLDERS.

WITH OR WITHOUT STEEL STANDARDS AND TANKS.

PURIFIERS. PURIFYING-MACHINES FOR AMMONIA. SCRUBBERS.
TAR-EXTRACTORS. RETORT MOUTHPIECES OF ANY SHAPE.

WECK'S PATENT CENTRE-VALVES.

CONDENSERS. **CRIPPS'S GRID-VALVE** TAR-BURNERS.

SIEVES. For bye-passing the lower layer in Purifiers. VALVES.

TYSOE'S SELF-SEALING MOUTHPIECES.

Tar-Distilling Plants. **Claus' Sulphur-Recovery Plants.**

SULPHATE OF AMMONIA PLANTS.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at th Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.
JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for use in GAS-WORKS.
ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.
HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.
MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, See p. 1674.]

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

ENRICH your Gas with cheap Benzol.
Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

PRACTICAL RETORT SETTERS.
GEORGE NUTTALL & CO., 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.
JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application
No. 30, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

WANTED, all kinds of Pipe Laying, on very reasonable terms. Gas or Water. Over twenty years' experience. Day-work or piece-work.
Apply to W. LOWE, 15, Brompton Row, Dewsbury Road, Leeds.

THE Advertiser wishes to place his son at a Gas-Works in England under an Engineer. Make per annum not less than 100 million cubic feet. Terms by arrangement.
Address No. 3515, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER wants Situation as ASSISTANT SECRETARY or CHIEF CLERK in Gas Company's Office. Nine years' experience of Gas Office work; and six years in Accountant's Office. Thirty years of age. Excellent testimonials.
Apply to No. 3517, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TWO Stokers, used to Shovel charging, wanted at once.
Apply, WYVER, Gas-Works, WHITSTABLE.

WANTED, Two experienced Retort SETTERS. Good wages to competent men.
Apply, by letter, to No. 3516, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a competent, reliable man, to take charge of a small private Gas-Works. Single man preferred.
Apply, by letter, giving References, to J. BEVAN, Clerk of Works Office, Elveden, near THETFORD.

WANTED, Retort Setters. Must be capable men, and able to take charge and work from drawings.
Apply, stating Experience and Wages required, to JONAS DRAKE AND SON, Ovenden, HALIFAX.

WANTED, a Good, Reliable, Experienced DRAUGHTSMAN in a Gas Engineering Firm.
Apply, with full Particulars, Character, Salary, and Experience, to No. 3514, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Man Wanted for an American Gas-Works, making at present 50 million cubic feet per annum. One who has also had experience as Secretary of such a Company preferred.
Apply, in writing, to J. A. KELMAN, 251, Winchester House, OLD BROAD STREET, E.C.

MANAGER Wanted for a Foreign Gas-Works, capable of large increase upon its present output. Commencing Salary about £300 per annum.
Address, "DIRECTOR," care of Burbidge, Wilcox, and Co., Advertising Agents, 62, MOORGATE STREET, E.C.

THE RAUNDS GASLIGHT AND COKE COMPANY LIMITED.
WANTED, at once a Mainlayer and FITTER.
Apply, on or before Thursday, June 21, to E. J. WHITNEY, Secretary, Raunds Gas Company, Raunds, NORTHAMPTONSHIRE.

WANTED, a Working Manager for a Gas-Works. Practical man who can Superintend and do anything that is required on a Works with a make of 4 million cubic feet per annum. Salary 20s. per week, with House, Coal, Gas, and a Bonus on results.
Apply, with Testimonials, to the CHAIRMAN, Gas Company, Seaton, DEVON.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.
BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

WANTED, one or two steady Men as STOKERS. Used to Shovel Charging. Good Wages given, and Permanency to good Men.
Apply to H. HAMILTON, Gas-Works, CHERTSEY.

WANTED, a Foreman Gas-Fitter, capable of superintending Service Laying and all Outdoor Work in connection with a Gas Company, including the Fixing, &c., of Gas-Stoves and Fitting up Houses under the Prepayment Meter System.
Address, in writing, stating Age, Wages required, and References, to No. 3518, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

YOUGHAL (CO. CORK) URBAN DISTRICT COUNCIL.
WANTED, a Manager for the Youghal Gas-Works. Make about 6 millions. Must be a mechanic and understand carbonizing. From 25 to 35 years of age. Wages, 45s. weekly, with free House, Garden, Light, and Firing.
Apply, in own handwriting, with *copies* of Two recent Testimonials, to the Council's Engineer, Mr. R. BRUCE ANDERSON, 35A, Great George Street, LONDON, S.W.

WANTED, new or second-hand, a Steel TANK, of the capacity of 400 gallons, mounted on strong Wheels and Frame.
State Price, with or without Valves, to the MANAGER, Gas-Works, FORMBY.

ALTON GAS AND COKE COMPANY.
WANTED, by the above Company, two good PURIFIERS, from 20 to 25 feet square, with or without Lifting Gear.
Full particulars to F. BARNLEY, Manager, Gas-Works, Alton, Hants.

ENGINES and Exhausters combined "Waller," to pass 30,000 cubic feet per hour. DITTO to pass 7000 feet per hour, overhauled and complete. Cheap to clear. Also BOILERS.
J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

FOR SALE, a No. 1 Thorscar Acetylene GENERATOR, for Fourteen Burners, with guarantee from the manufacturers. Never been used. What offers?
Apply to No. 3513, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Two Lancashire Boilers, each 6 ft. diameter by 20 ft. long, with Mountings. Been in use only a short time. Made by the Yorkshire Engine Company, Limited, Sheffield.
Apply to NEWTON, CHAMBERS, & CO., LIMITED, Thorncliffe Iron-Works, near SHEFFIELD, where the Boilers may be seen.

GASHOLDER, 50 ft. by 20 ft., with Six Columns, 15 inches diameter, Wrought Lattice Girders, &c., complete and perfect. About Fourteen Years old.
Price, erected, on application to J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

CONDENSERS, Washer-Scrubbers, "Cutler" patent CONDENSERS (14) 6 in. to 12 in. PIPE CONDENSERS, Patent WASHERS by "Livesey," "Holmes," and "Cockey," EXHAUSTERS up to 60,000 Cubic Feet per hour. ENGINES, BOILERS, &c. Several TOWER SCRUBBERS, PURIFIERS, METERS, GOVERNORS, PUMPS, TANKS, VALVES, &c.
J. FIRTH BLAKELEY AND CO., Gas Engineers, DEWSBURY.

FOR SALE—Two small Boilers, 6 feet long, 3 feet diameter, each fitted with two 9-inch Flue Tubes. Equal to new, with Fittings and Furnace Doors and Frames. Price £12 10s. each, or £22 the pair.
Also two 8-inch FLANGED T-PIECES and ELBOW CONNECTIONS, for Exhauster Bye-Pass, with Cockey and Smith's Patent Bye-Pass Valve, 4-inch Branch, and Throttle Valve and Compensator.
For further Particulars apply to the MANAGER, Gas-Works, Sandown, ISLE OF WIGHT.

THE Calne Gas and Coke Company, Limited, have FOR SALE the following APPARATUS. Offers to be sent to the Secretary at Church Street, Calne, Wilts.

All necessary CONNECTIONS for three Purifiers by Cockey and Sons, comprising:—

One Lift for 8-feet Purifier.
Four 6-inch Back and Pinion Valves.
One 6-inch Centre-Valve with Column.
One 6-inch Bye-Pass Valve with Column.
Nineteen 6-inch Bends and Springs.
One 6-inch T-Piece.
Thirteen Caps and Clips.

RUGBY GAS COMPANY.

FOR SALE—One 20,000 cubic feet per hour WALLER THREE-BLADE EXHAUSTER, with Engine Combined, with Disc Valves, Governor, &c., complete.

One 30,000 cubic feet per hour DONKIN COMBINED ENGINE and EXHAUSTER, with Valves, Governor, &c., complete, and Bye-Pass Valve and Connections.

Both Exhausters have been working until May, and are now replaced by larger ones.

Permission to view, and any further Particulars required, to be obtained from the undersigned.

C. MEIKLEJOHN,
Engineer and Manager.

SUTTON, SOUTHCOATES, AND DRYPOOL GAS COMPANY, HULL.

THE Directors of the above Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Twelve Months ending the 30th of June, 1901.

Probable quantity of Tar, 1000 Tons.

Probable quantity of Ammoniacal Liquor, 1200 Tons.

Tenders for Liquor must state price per Ton, per degree Twaddel's Hydrometer from 4° to 8°.

Tenders to be sent to the undersigned on or before the 25th of June, 1900, marked "Tender for Tar" or "Liquor."

The Directors do not bind themselves to accept the highest or any Tender.

DAVID WOOD,
Secretary.

Offices: St. Mark's Street, Hull,
June 6, 1900.

NEWARK GAS COMPANY.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR produced at their Works for One Year from the 1st day of July, 1900, at per degree Twaddel (Temperature 60° Fahr.).

The Liquor to be not less than 5° in strength.

Terms: Cash monthly.

Further Particulars can be had on application to the undersigned, to whom sealed Tenders, marked on the outside "Tender for Liquor," are to be sent on or before the 20th inst.

The highest Tender will not be necessarily accepted.

F. B. FOOTTIT,
Secretary.

Newark, June 2, 1900.

NEWARK GAS COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Newark Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works, free on rail, G.N. Rly. or M. Rly. in Purchaser's Tanks, for One Year from the 1st day of July, 1900.

Terms: Cash monthly.

Further Particulars can be obtained on application to the undersigned, to whom sealed Tenders are to be sent on or before the 20th inst., marked on the outside "Tender for Tar."

The Directors do not bind themselves to accept the highest or any Tender.

By order,
F. B. FOOTTIT,
Secretary.

Newark, June 2, 1900.

CITY OF NOTTINGHAM.
(WATER DEPARTMENT.)

TENDERS FOR THE SUPPLY OF VALVES AND HYDRANTS, PIPES, LEAD, COAL, TAPS, AND FITTINGS.

THE Water Committee of the Corporation are prepared to receive TENDERS from competent Ironfounders, Brassfounders, Valve Manufacturers, Lead Merchants, and Colliery Proprietors and Coal Merchants for the Supply of the undermentioned goods for the ensuing year:—

1. CAST-IRON DOUBLE-FACED SLUICE VALVES and HYDRANTS.
2. CAST-IRON MAIN PIPES.
   CAST-IRON SPECIAL PIPES.
3. LEAD PIPING.
   LEAD INGOTS.
4. GUN METAL TAPS and FERRULE FITTINGS.
5. STEAM COAL and OTHER FUEL.

Specifications and Drawings, together with Samples, Weights, &c., may be seen, and other Information obtained, at the Office of the Water Manager, Mr. Stephen Moore, St. Peter's Church Side; and Forms of Tender may be obtained at that Office on payment of One Guinea, which sum will be returned on receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Tender for Valves," "Tender for Pipes," "Tender for Lead," "Tender for Taps," or "Tender for Coal," to be delivered to me at the Guildhall, Nottingham, on or before the 30th of June inst.

The Committee do not bind themselves to accept the lowest or any Tender.

By order of the Water Committee,
SAMUEL G. JOHNSON,
Town Clerk.

Guildhall, Nottingham,
June 13, 1900.

GLYNCORRWG URBAN DISTRICT COUNCIL.

CONSTRUCTION OF GAS-WORKS.

THE above Council invite Tenders for the erection and completion of a new GAS-WORKS, MANAGER'S DWELLING-HOUSE, and TRUNK MAIN, on a site situate at Cymmer, in the County of Glamorgan, on the Rhondda and Swansea Bay Railway, in accordance with Drawings and Specification prepared by Mr. R. A. Browning, A.M.Inst.C.E., Engineer, Neath.

The Drawings and Specification can be inspected, and all Information obtained, from the Engineer, at his Offices, Gas-Works, Neath.

Tenders, under seal, to be delivered to the undersigned, on or before the 27th inst.

CUTHBERTSON AND POWELL,
Clerks to the Council.

58, Water Street,
June 11, 1900.

COUNTY BOROUGH OF BURNLEY.

TO TAR DISTILLERS.

THE Gas Committee of the Corporation of Burnley are prepared to receive TENDERS for the surplus TAR produced at their Gas-Works during the period of Twelve Months ending March 31, 1901.

The Tar will be delivered by the Corporation into boats provided by the purchaser at the Gas-Works Wharf, on the Leeds and Liverpool Canal. The quantity will be approximately 3000 tons.

Tenders, under seal, endorsed "Tender for Tar," and addressed to the Chairman of the Gas Committee, Town Clerk's Office, Town Hall, Burnley, to be delivered not later than Wednesday, the 27th of June, 1900.

JOHN P. LEATHER,
Gas Engineer.

Gas-Works, Burnley,
June 9, 1900.

MOUNTAIN ASH URBAN DISTRICT COUNCIL.

TO CONTRACTORS.

THE Council invite Tenders for the supply and erection at their Gas-Works, Penrhiwceiber, of one CORNISH BOILER, 16 by 4½ feet, and a 20,000 cubic feet per hour ROTARY EXHAUSTER and ENGINE.

Drawings and Specification may be seen, and Forms of Tender obtained on application to, Mr. J. Williams, Town Hall, Mountain Ash, on and after Monday, the 25th inst.

Sealed Tenders, prepaid and endorsed "Boiler, Exhauster, &c.," to be sent to me at or before 1 o'clock on Tuesday, the 10th of July.

The Council do not bind themselves to accept the lowest or any Tender.

It is particularly requested that all Tenders be endorsed.

By order,
H. P. LINTON,
Clerk to the Council.

Town Hall, Mountain Ash,
June 13, 1900.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee invite TENDERS for the supply of:—

1. OILS, PAINTS, &c.
2. BRUSHES.
3. BRASS MAIN COCKS and UNIONS.
4. WROUGHT-IRON TUBES and FITTINGS.
5. CAST-IRON PIPES.
6. INDIA-RUBBER GOODS.
7. BRASS LAMP FITTINGS.
8. SULPHURIC ACID.
9. OXIDE OF IRON.

And for the purchase of—

1. SPENT OXIDE OF IRON.
2. GAS CARBON.
3. BRIMSTONE.

For the Twelve Months ending June 30, 1901.

Forms of Tender and further Information may be obtained on application to Mr. Thomas Holgate, M.Inst.C.E., Engineer, Gas-Works, Halifax.

Tenders properly endorsed, to be sent to the undersigned, before Two o'clock p.m. on Wednesday, the 27th of June, 1900.

The persons whose Tenders are accepted will be required to observe the Fair Contract Clauses adopted by the Corporation.

By order,
KEIGHLEY WALTON,
Town Clerk.

Halifax, June 16, 1900.

KENT WATER-WORKS.

TENDERS FOR COAL.

THE Directors of the Kent Water-Works Company invite TENDERS for the supply of SCREENINGS from the best Durham COAL, at their Pumping-Stations at Crayford, Orpington, and Wilmington, Kent, for One Year. Approximate weekly quantities: Crayford, 50 to 65 Tons; Orpington, 45 to 55 Tons; Wilmington, 70 to 90 Tons; or, alternatively, for the supply of such Coal in Cargoes, f.o.b. or alongside in the River Thames, in a bulk supply of 10,000 Tons.

The Coal must be delivered in good and proper condition, and must evaporate not less than 7 lbs. of water for each pound of Coal, and be perfectly free from slag or other mineral or earthy matter. The percentage of ash and clinker to be adopted as the agreed limit will be specified.

Payments monthly, upon Engineer's certificate.

The Directors do not bind themselves to accept the lowest or any Tender.

The Draft Contract can be inspected, and other Particulars obtained, at the Company's Offices, Mill Lane, Deptford.

Tenders, marked "Tender for Coal," to be transmitted under seal on or before Saturday, June 30, to

A. DICKSON, Junr.,
Secretary of the Company.

June 16, 1900.

TENDERS FOR GAS COAL.

THE Gas Committee of Limerick are prepared to receive TENDERS for a supply of GAS COAL, according to Specifications to be had on application at the Gas Offices, 34 and 35, William Street.

Limerick, June 14, 1900.

ALTON GAS AND COKE COMPANY.

THE Directors of the above Company invite TENDERS for their surplus TAR and LIQUOR. Coals carbonized, 2000 tons.

All persons tendering must supply casks delivered at Alton Station.

Particulars from F. BARNLEY, Manager, Gas-Works, Alton, HANTS.

THE Northallerton Consumers' Gas Company, Limited, invite Tenders, Plans, and Specifications for a new or a good second-hand EXHAUSTER, with Steam-Engine combined, to pass 5000 cubic feet per hour, with Valves, Governor, Bye-Pass Valves, and all Connections complete.

Tenders to be received not later than the 5th day of July next.

J. A. SQUINCE,
Secretary.

BOROUGH OF CONGLETON.

THE Gas Committee invite Tenders for the supply of 4000 Tons of best screened GAS COAL, BURGY, or WASHED NUTS, to be delivered between July 1, 1900, and June 30, 1901.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Clerk's Office, not later than Monday, the 25th inst.

Further Particulars may be obtained from the undersigned.

WM. ORME,
Engineer and Manager.

BOROUGH OF CONGLETON.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR and LIQUOR to be produced at their Gas-Works between July 1, 1900, and June 30, 1901.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Clerk's Office, not later than Monday, the 25th inst.

Information may be obtained from the undersigned.

WM. ORME,
Engineer and Manager.

CITY OF CARLISLE.

THE Carlisle Gas Committee invite TENDERS for the supply and erection of PLANT for the manufacture of CARBURETTED WATER GAS.

Particulars to be obtained from the undersigned, to whom Tenders are to be forwarded not later than June 30.

The Committee do not bind themselves to accept the lowest or any Tender.

C. B. NEWTON,
Engineer and General Manager.

Gas-Works, Carlisle,
June 12, 1900.

TO COAL CONTRACTORS AND OTHERS.

THE Sedgley Urban District Council invite TENDERS for supplying 800 to 1000 Tons of GAS COAL, the deliveries to be made at the Shut End Siding at such times and in such quantities as may be directed.

Sealed Tenders marked "Coal," must reach me on or before the 26th of June.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
JOSEPH SMITH
Clerk to the Council.

Offices: High Holborn,
Sedgley, June 8, 1900.

BOROUGH OF SMETHWICK.

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of about 30,000 Tons of screened and unscreened GAS COAL, and screened and washed GAS NUTS for delivery during the Year ending June 30, 1901.

Form of Tender and further Information may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Gas Committee, Town Hall, Smethwick, to be sent in not later than the 28th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
W. J. STURGES,
Secretary.

Gas Offices, Town Hall,
Smethwick, June 6, 1900.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF ORDINARY STOCK.

THE Directors have instructed Mr. ROBERT MACK to SELL BY AUCTION, at the Offices of the Company, Newcastle-upon-Tyne, on Wednesday, the 11th day of July, 1900, at 12 o'clock noon,

£25,000 ORDINARY STOCK

of the Company, to be issued under the Powers of the Company's Act of 1896.

For Conditions of Sale and further Particulars apply to the undersigned.

THOMAS WADDOM,
Secretary.

Offices: 35, Grainger Street West,
Newcastle-upon-Tyne, 1900.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, relating to DEBENTURE STOCK only, WILL BE CLOSED on the 16th, and RE-OPENED on the 30th inst.

S. J. WILLIAMS,
Secretary.

63, Chancery Lane,
June 12, 1900.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £30,000 THREE PER CENT. PERPETUAL DEBENTURE STOCK.

MINIMUM PRICE, £97 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £30,000 of THREE PER CENT. PERPETUAL DEBENTURE STOCK, in accordance with the Provisions of the South Metropolitan Gas Acts, 1882 and 1896.

Particulars of same, with Form of Tender, can be obtained at this Office on application to the undersigned; and Tenders must be sent in on or before Tuesday, the 10th day of July next.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower price than at the rate of £97 money for each £100 Debenture Stock.

By order,
FRANK BUSH,
Secretary.

Offices: 709A, Old Kent Road,
London, S.E., June 9, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

£2900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Friday, June 29, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 10, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
EAST GRINSTEAD GAS AND WATER COMPANY.

NEW ISSUE OF 500 £10 CAPITAL "C" SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, July 10, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

PUBLICATIONS

ISSUED BY

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

HANDBOOK FOR GAS ENGINEERS AND MANAGERS.—By THOMAS NEWBIGGING, M.Inst.C.E. Sixth Edition. *Price, Morocco Gilt,* 21s.; *Roan Gilt,* 18s. (Fcap. 4to., pp. 535, with 239 illustrations and Steel-Plate Engraving, as Frontispiece, of William Murdoch, Inventor of Gas Lighting).

THE VALUATION OF GAS, ELECTRICITY, AND WATER WORKS FOR ASSESSMENT PURPOSES.—Second Edition. By THOMAS NEWBIGGING, M.Inst.C.E., and WILLIAM NEWBIGGING, Assoc.M.Inst.C.E. *Price 5s.*

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES: A History of the Question of Price in London from the Introduction of Gas Lighting to the Present Time. By LAURENCE W. S. ROSTRON, M.A., B.C.L., of New College, Oxford, and Lincoln's Inn, Barrister-at-Law. With a Preface by GEORGE LIVESEY, M.Inst.C.E. *Price 6s., post free.*

ARUNDEL GAS COMPANY.

ISSUE OF £1000 OF CONSOLIDATED ORDINARY STOCK.

SPARKS AND SON, favoured by Instructions from the Directors, will SELL BY AUCTION, at the Norfolk Hotel, Arundel, on Tuesday, the 3rd day of July, 1900, at seven p.m. precisely, in one hundred lots of £10 each,

£1000 OF CONSOLIDATED ORDINARY STOCK

in the above Company, bearing Interest at 5 per cent. per annum, subject to the Sliding-Scale Clause.

The Stock will rank for dividend as from the 1st of July, 1900.

Full Particulars, with Conditions of Sale, may be obtained of RICHARD HOLMES, Esq., the Company's Secretary, ARUNDEL, and at the Offices of the AUCTIONEERS, ARUNDEL or LITTLEHAMPTON.

Now Ready. Price 6s.

LAW
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LONDON GAS COMPANIES

A SYNOPSIS of Public Acts affecting Gas Companies and of the Special Acts of the Metropolitan Companies, with Comments and a Short History: Including a Statement of the effects of the Conversion Acts of the GASLIGHT AND COKE COMPANY, and of the SOUTH METROPOLITAN COMPANY, and an Examination of the Capital and Loan Accounts to date of the three London Companies and of the Bills now before Parliament.

BY

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NITRATE of Thorium and Cerium.
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WELDON MUD
FOR
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For use in the

RECOVERY OF SULPHUR,

ALSO

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THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

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OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

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Gas Companies are solicited to try Samples of the

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Highest Results in Gas, & Excellent Coke.

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Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

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Hot Bath when wanted.

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ALFRETON IRON-WORKS, DERBYSHIRE,
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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

HOLMSIDE
GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
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Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

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FROM THE
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Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
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OUT OF THEIR
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Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
Ash . . . . . 2·73 „

For Price, &c., apply to the
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Yield of Gas per Ton. . 10,500 Cubic Feet.
Illuminating Power . . 16·9 Candles.
Coke . . . . . 66·7 Coke.
Sulphur . . . . . 0·86 Sulphur.
Ash . . . . . 2·04 Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

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Yield of Gas per ton . . . . 13,155 cub. ft.
Illuminating Power . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.
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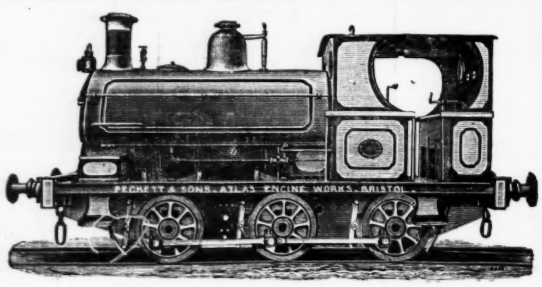

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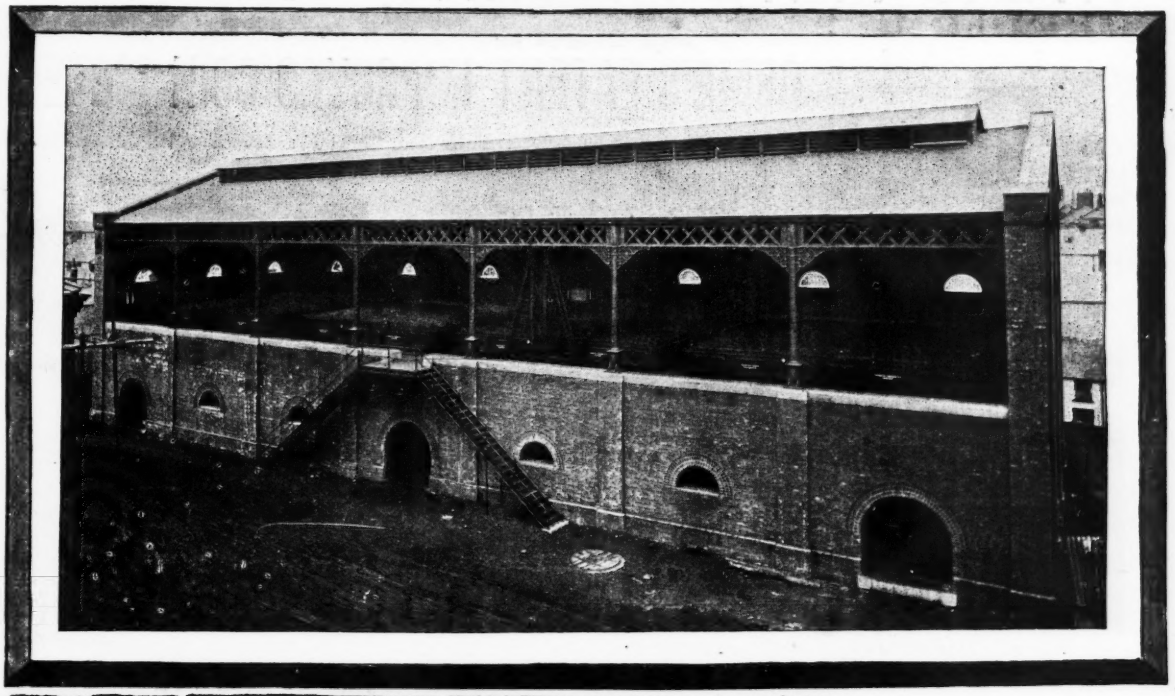

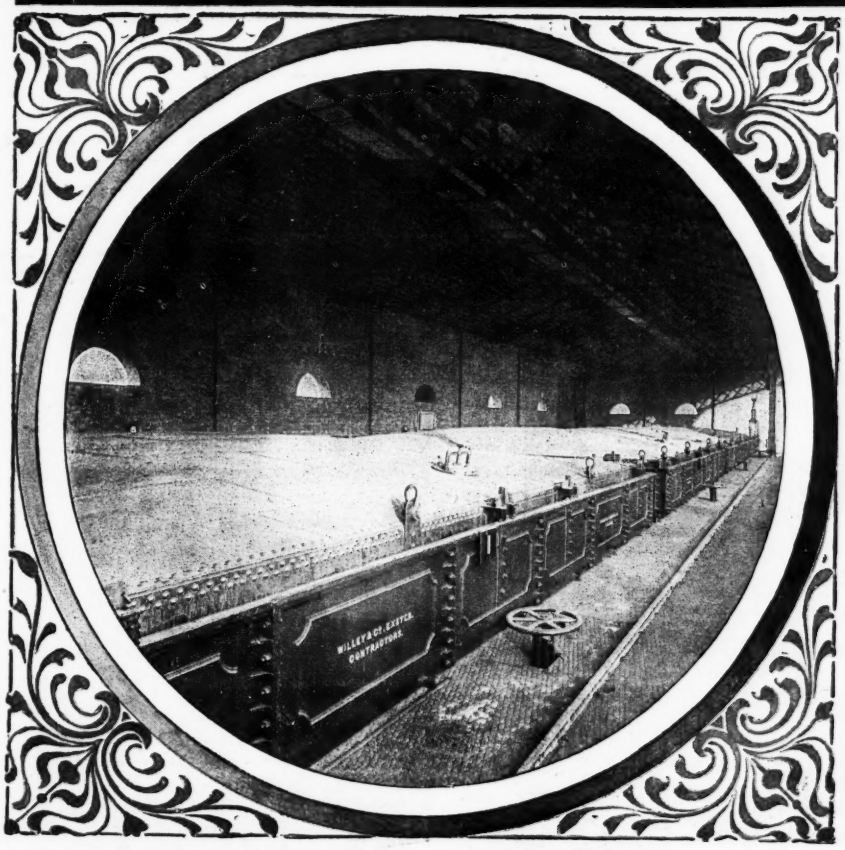

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WITH STAGING, ROOF, 24-IN. VALVES & CONNECTIONS, &C., COMPLETE.

Recently CONSTRUCTED and ERECTED for the

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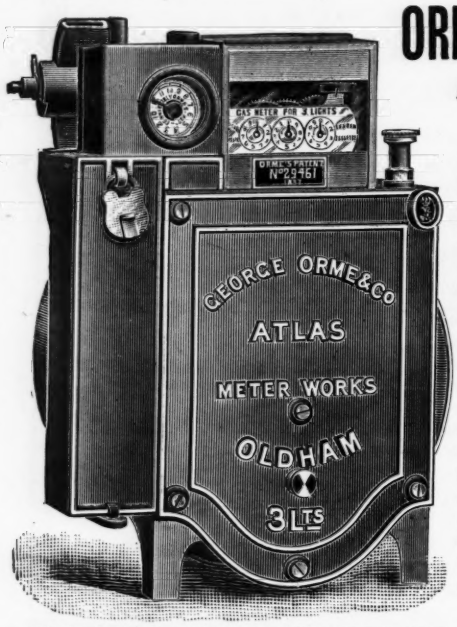
As Supplied to most of the PRINCIPAL GAS COMPANIES AND CORPORATIONS.



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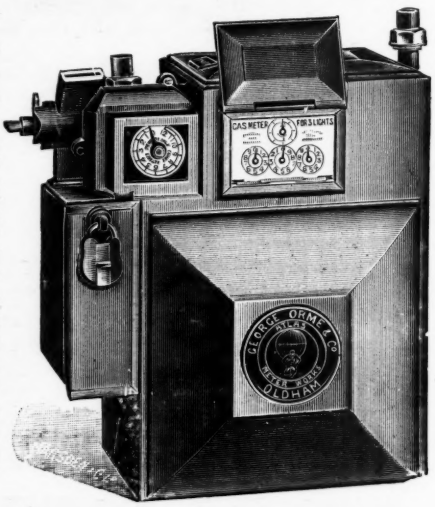
Many thousands are now in use and giving every satisfaction. The mechanism is very simple, and there are no springs or complicated parts to get out of order. We supply these Meters to work with **1d.**, **1s.**, or any other coin desirable. The selling price of gas can be changed *in situ*, and any number of feet delivered as may be required. We keep a stock of coin meters, and can deliver at once, of the following descriptions—viz., Wet Meters in Cast-Iron or Tin-Plate Cases, either Ordinary or Compensating, and Dry Meters in Tin-Plate Cases. Any further particulars desired sent upon application.



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MANUFACTURERS OF

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In Cast-Iron and Tin-Plate Cases.

STATION METERS. GOVERNORS, TEST HOLDERS, and METERS.

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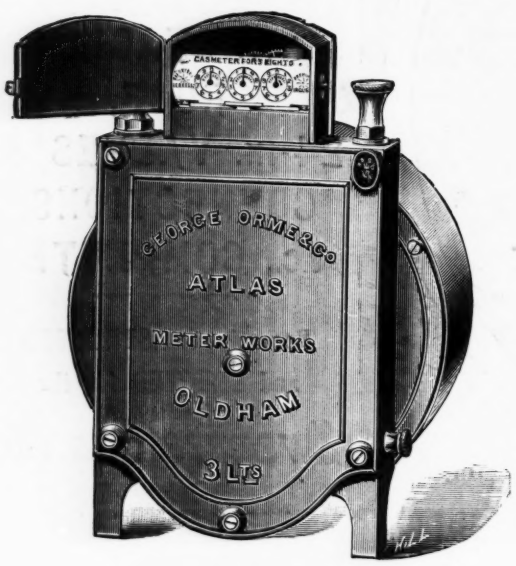
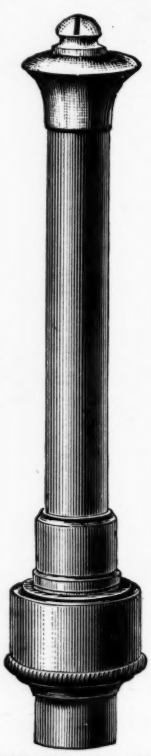
All kinds of STEAM, GAS, and WATER FITTINGS.



WET METER IN CAST-IRON CASE.



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NO. 200. ORME'S GAS REGULATOR FOR STREET LAMPS.

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NELSON METER WORKS,

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The FIRST Makers of a SUCCESSFUL Prepayment Attachment.

Meter in Working Position.

SOLE MAKERS OF THE

"POSITIVE"
PREPAYMENT GAS METERS,

WET AND DRY.

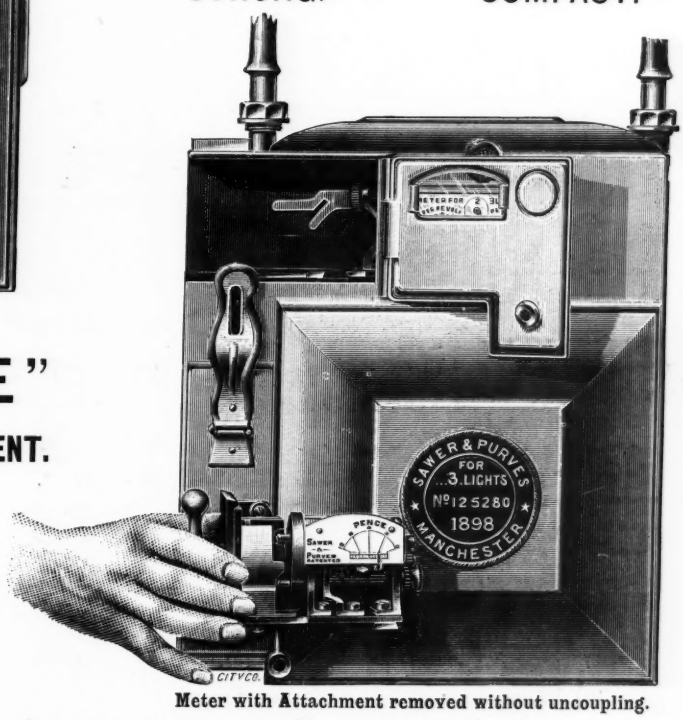
Mechanism used is

POSITIVE. ACCURATE.
SIMPLE.
STRONG. COMPACT.

THE "POSITIVE"
DETACHABLE PREPAYMENT ATTACHMENT.

FRAUD PROOF.
PRICE READILY CHANGED.
EASILY DETACHED.
GUARANTEED FOR **5** YEARS.

TENS OF THOUSANDS WORKING.



Meter with Attachment removed without uncoupling.

The following advantages are claimed for the New "Positive" Attachment:—

HEIGHT.—The prepayment meter is no higher than an ordinary one.

CONSTRUCTION.—**Simple.** No parts liable to derangement.
Positive. Value of large area, opened and closed positively.
Accurate. Screw action mechanically accurate.
Durable. All parts well and strongly constructed.

CHANGE MECHANISM.—One wheel only requires changing, and this can be done without taking meter out of box.

FRAUD PROOF.—After a coin is introduced it must be delivered into money-box and cannot be removed.

BENT COINS do not jam, or affect the working of this attachment; the coin receiver being made specially for the purpose.

DETACHABILITY.—Without removing the meter from the box the prepayment attachment can be withdrawn for adjusting the change mechanism or any other purpose, and replaced in a minute or two. This is absolutely novel and is covered by Letters Patent, and effects a **great saving** in time and wages.

PRICES AND FURTHER DETAILS ON APPLICATION.

EVERED & CO., LTD.,

27 TO 35, DRURY LANE, LONDON.
SURREY WORKS, SMETHWICK.
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Brass Gas-Fittings Manufactory—SURREY WORKS, SMETHWICK.
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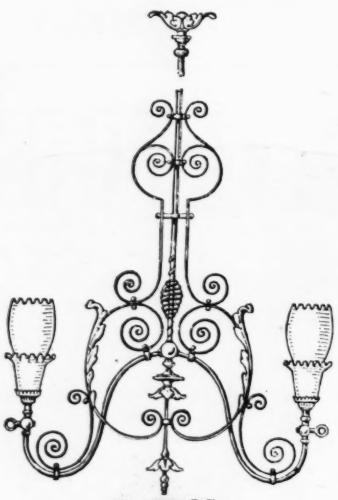
A New List of

WROUGHT-IRON AND COPPER FITTINGS
FOR INCANDESCENT GAS LIGHTING

is now being issued to the Trade.

We give below a few Examples.



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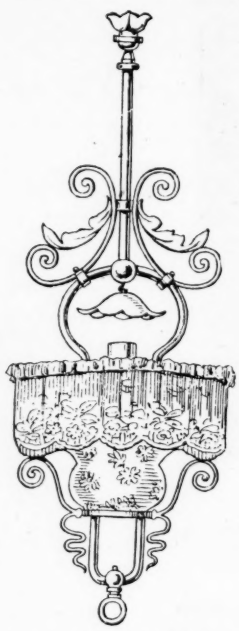

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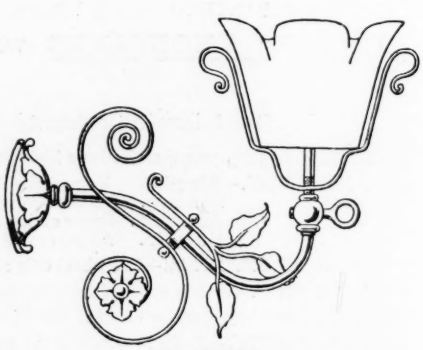
No. 1111 I.C.



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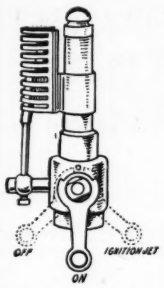
For Ordinary Burner.



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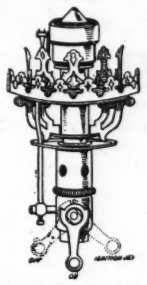

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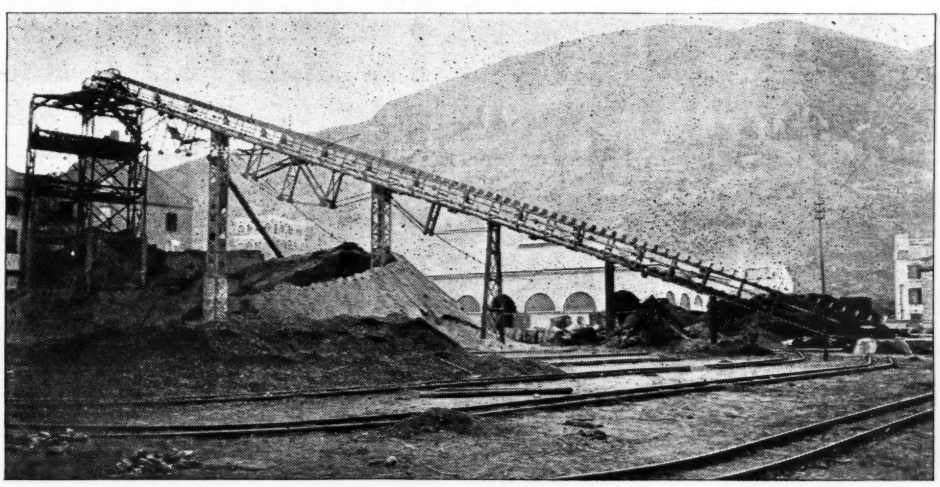

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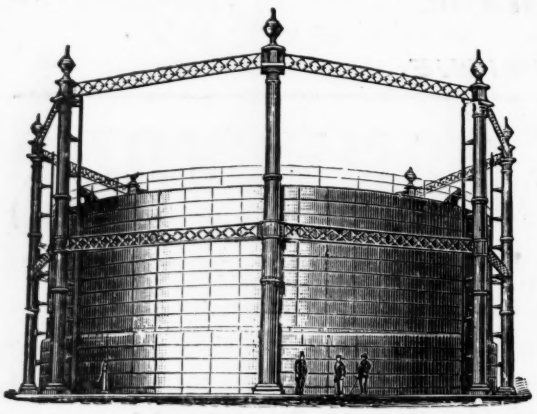

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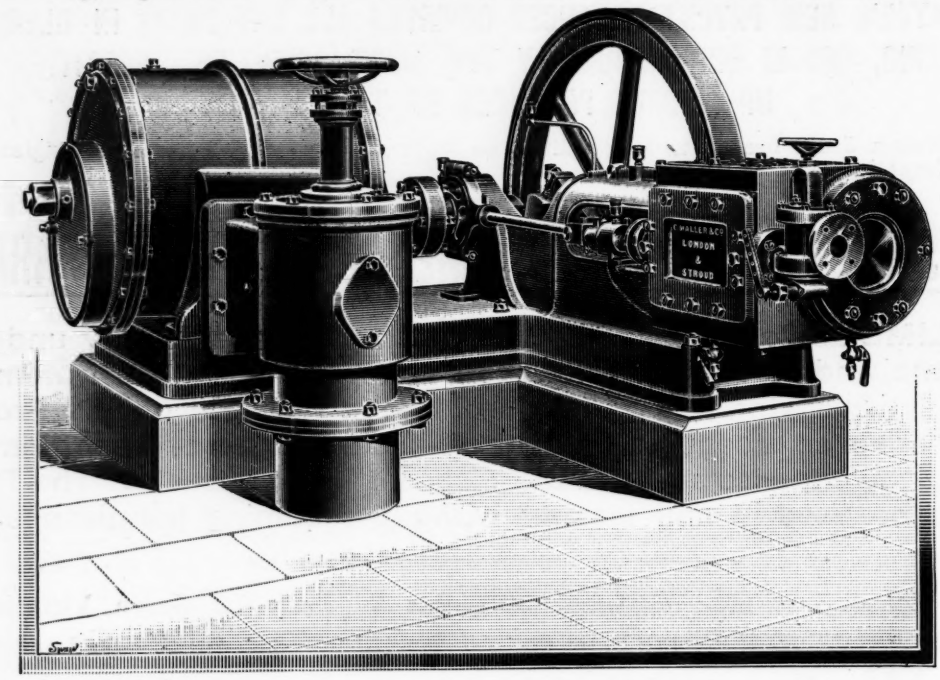

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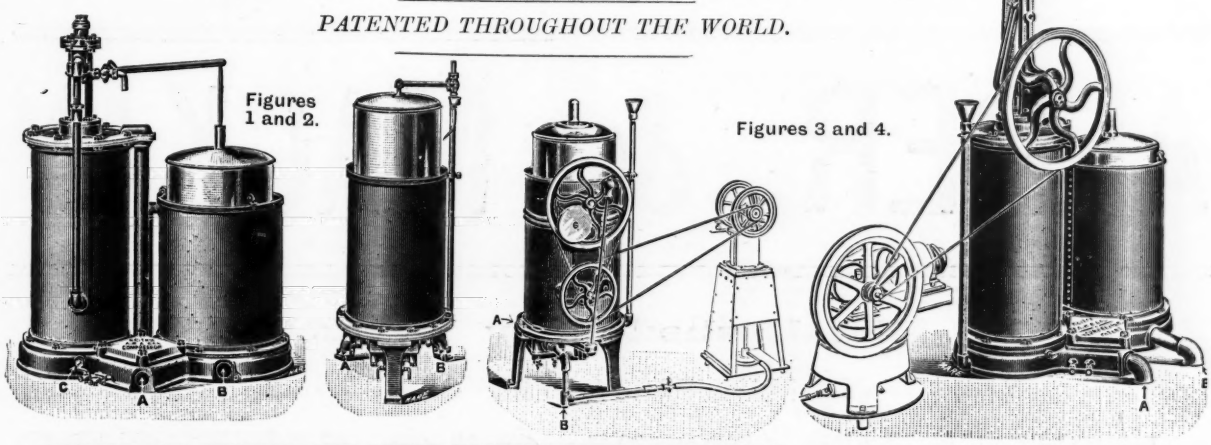

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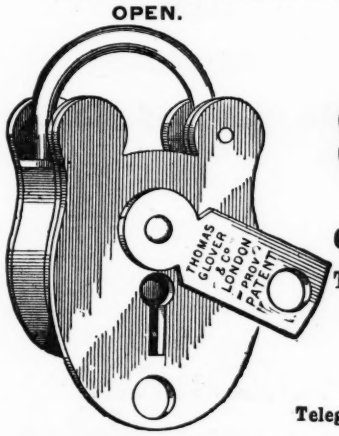

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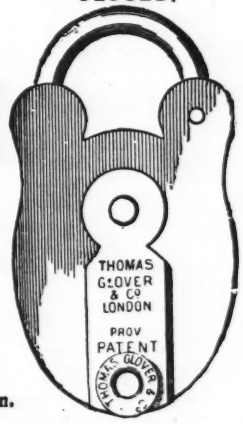

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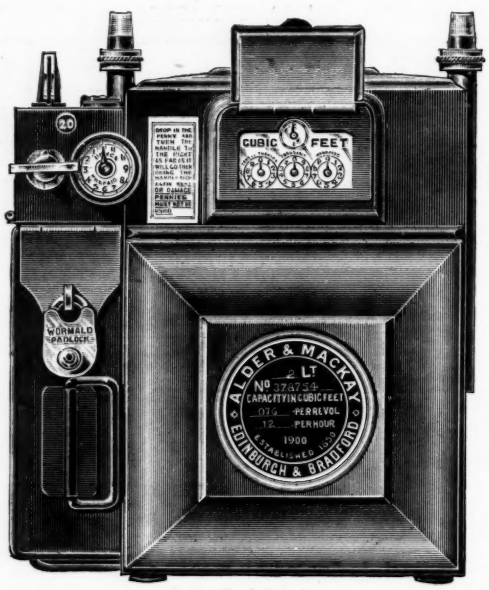

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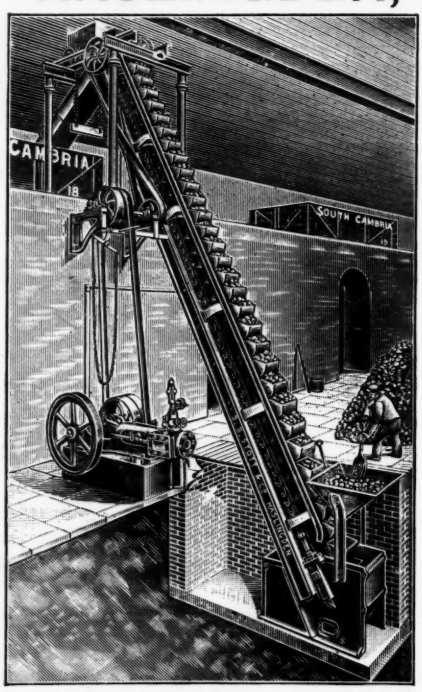

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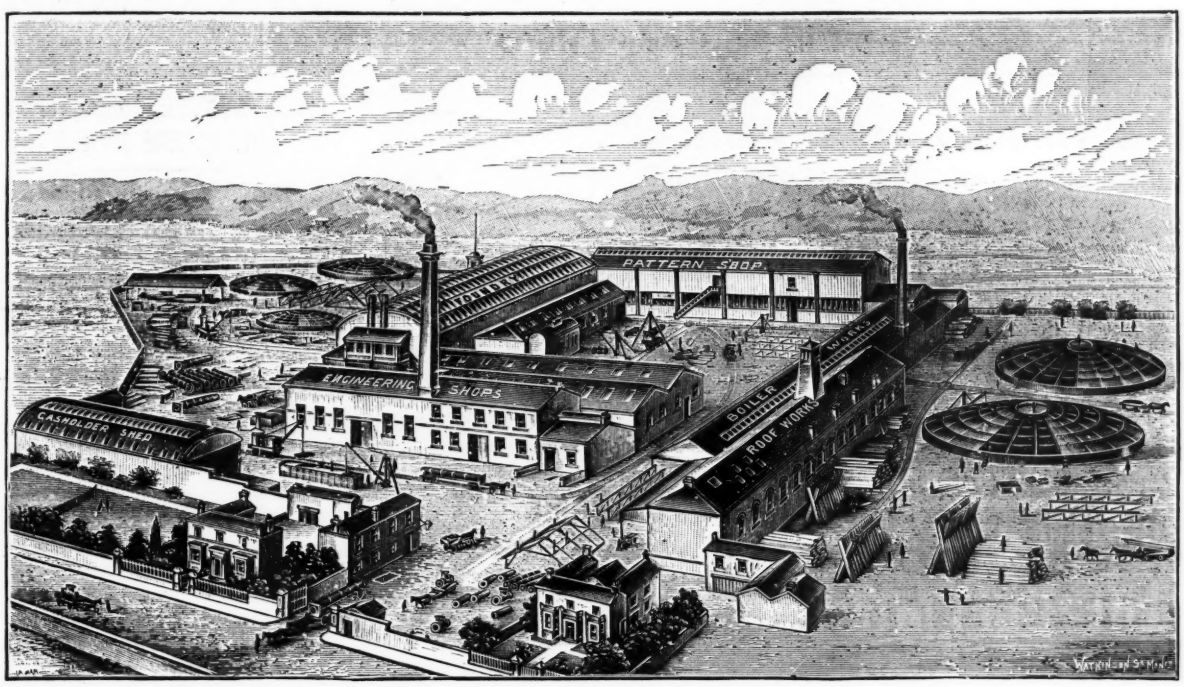

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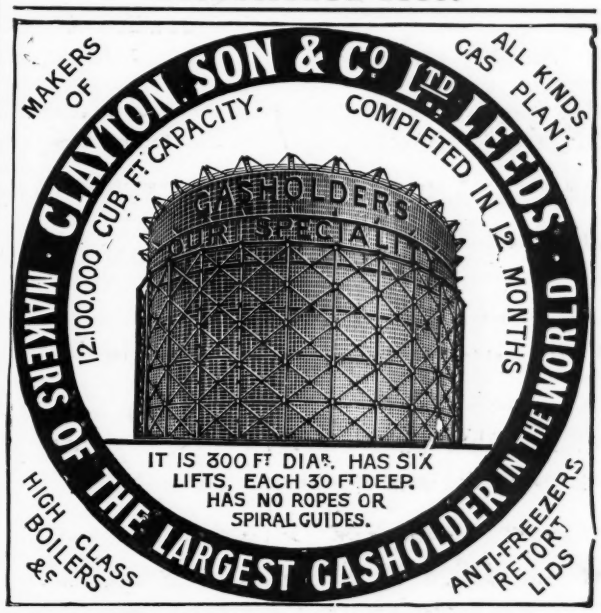
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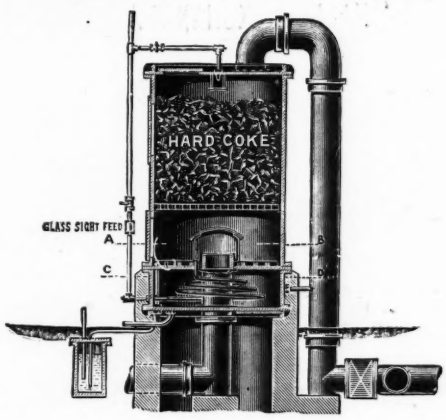

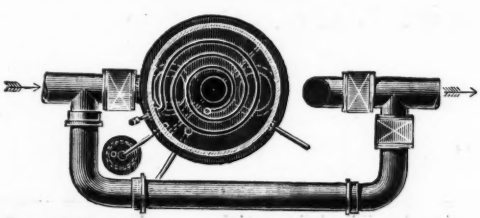

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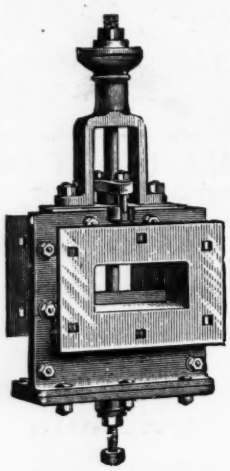

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